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Economics with a Big E

FOUR separate and distinct concerns have impinged and conspired to make this the first issue of *American Machinist* ever to be almost wholly devoted to that so-called dismal science, Economics. Almost all the regulation departments are here, but the space normally devoted to general articles on pertinent shop and executive subjects is given over to this subject so vital to human and industrial well-being yet so little appreciated and understood.

I. The world is seemingly at the mercy of a world economics gone out of control. With production at low ebb, manufacturers, executives, operatives everywhere are naturally wondering what it is all about and just as naturally seeking the answers.

II. At the Business Stabilization Session of the recent A.S.M.E. Annual Meeting, in New York City, three masterful addresses on three vital phases of economics were presented by Dr. Virgil Jordan, James W. Hook, and Paul M. Mazur.

III. Two editors of *AM*, who attended this session, came away with the conviction that these three addresses were the best of the kind they had ever listened to. And then we began to hear from readers; some of them had heard the addresses in full, and some had read thin excerpts in the newspapers. All joined in a strong demand that complete transcripts be made available to every *AM* reader.

IV. This is the 53rd issue of 1931. Since the strict terms of the subscription contract call for but 52 issues per year on production, management, engineering and allied subjects, the editors were already casting about for something extra special to top off the year.

It was not difficult to come to a decision. Dr. Jordan, who is economist for all the McGraw-Hill Publications, was reached by telephone. He stated that he would be delighted to arrange his address for publication as a magazine article. Mr. Hook and Mr. Mazur proved equally as willing and cooperative. We put their writings into type in the order in which we received them.

Economics has a bad name, partly because it embodies certain unpleasant truths, mainly because it has so lately begun to shake off the dust of a modern scholasticism. But like certain medicines and certain of the more bitter things of life, or like the little boy who could not run away from his shadow, we cannot help taking Economics every day we live and we cannot run away from it.

Fortunately for this issue, our three authors know how to make Economics palatable. You will find their writings easy to read, but when you think them over afterwards, you will realize that you have been getting Economics with a big E.

Economic Aspects of Stabilization

VIRGIL JORDON
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To the economist, the concept of stabilization has a simple and clear significance. It means merely the maintenance of a continuously increasing consumption of the goods and services which a people are able to produce themselves or to buy from abroad by their labor. It does not imply the maintenance of any particular level or condition of prices, wages, business profits, or capital values. In fact, it is precisely because individuals and groups believe it does that instability is so serious and constant a characteristic of our whole economic system

BUSINESS stabilization within the United States is possible only on the basis either of comprehensive, continuous international cooperation, or of carefully controlled isolation. The first is an abstract ideal that will never be realized, at least in the form in which it is conceived today, with some sort of international currency and some super-national commerce commission regulating the free international flow of goods and services.

The fundamental forces point in the opposite direction. There is evident a definite trend toward intensified nationalism, which is the first expression of an underlying process of decentralization that marks the disintegration of capitalism in its present form. International trade and borrowing will be of diminishing importance relative to domestic trade and investment in every country, and many raw material and skilled labor monopolies upon which international trade has been built will be broken by synthetic chemistry, as indigo, nitrate, silk have been, and by universal mechanization. Economic differentials, dependent upon geographical interests, will ultimately cease to be of importance, and the motives of international cooperation will lose their force. This is

A redraft of a paper presented before the American Society of Mechanical Engineers, December 2, 1931.

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still a long way off; in the meantime, the problem of stabilization can be profitably approached only from the national point of view.

Stabilization on a national basis is perfectly possible, but it requires centralized control over exports and imports and foreign investment. Putting it the other way around, national stabilization is impossible without such control, and with the existing freedom to oversell or overbuy, overlend, or overborrow abroad. This is because national stability is now completely dependent upon certain credit and banking conditions which cannot be effectively controlled without prior control over external influences arising from international trade and finance.

Such control is now being exercised by every European country. It will not be applied to any large extent by the United States because of the banker and investment interests dominant in a creditor nation. Defaults and moratoria during this depression may wipe out a large part of our creditor position, check the increase of foreign investment, and permit better balancing of trade.

We may look, therefore, for a long period of casuistic compromise between certain superficial forms of international cooperation largely dictated by financial and exporting interests, and a contradictory, unintelligent nationalism reflected in crude tariff policies dictated by domestic industries and labor organizations. This compromise will be further complicated henceforth by the problem of gold reserves and devaluation of currencies. These are being and will be used as weapons of political and economic nationalism for the purpose of establishing certain trade areas and groupings like Franco-Europe and the British Empire, and the prospects of any effective international currency or banking cooperation to correct these complications are remote. Few nations now can handle even their internal banking problems successfully.

The result is that for a long time domestic efforts at stabilization must be carried on in face of unstable and disturbing influences from abroad. The consoling thing is that these influences are likely to diminish naturally in the course of time. In the meantime, it will be difficult to accomplish much, but something can be done to diminish their force.

We Must Eat Our Cake

The desirability of stablization is a little too much taken for granted in discussion of it. The importance or meaning of stabilization cannot be fully understood until we get a clearer idea of the significance of instability —its function in our economic set-up. The real problem of stabilization is how to get the advantages of instability without its disadvantages.

Wide business fluctuations are obviously a symptom of defects in our economic institutions; but what is not so obvious is that they are a rough—too rough—way of remedying the consequences of those defects. The central defect of capitalism as we now know it is the lack of any systematic or successful mechanism of income distribution—of dividing the product of industry between wages and investment funds. The reason why this is serious is that it prevents a balance between saving and spending, consumption and production, upon which stability depends.

Modern industry—and agriculture too—based not on labor, but on utilization of an almost free fund of solar energy accumulated in coal, oil, and water power, is so productive as compared with human and animal energy, dependent on food, that prices would disappear and profits, wages, and capital values could not be maintained without some sort of systematic deliberate or unconscious sporadic sabotage by employers, financial interests, and labor. But despite all this sabotage, productivity still increases at such a rate that prices, profits, and return on capital can be maintained only by an equally rapid increase of consumption and consumer purchasing power. A larger and larger part of the product must go to those who spend their income, immediately or in advance (by consumer credit), and the rest must reinvest their surplus income more and more promptly (and continually in excess of their savings, through bank credit) in order to retain it. And, further, this reinvestment must be continuously or periodically confiscated or transformed into consumer purchasing power without return in order to keep that consumption up to production. Capitalism in every highly developed industrial nation is essentially a system under which we must continuously or periodically eat our cake in order to have it.

We had learned, in very concrete ways, that continuous consumer demand is dependent not merely upon consumer purchasing power in the strictly accounting sense, but also upon conditions of consumer psychology which we so far understand little about, and are still satisfied to sum up in the vague term "confidence"

Ideally, the conditions of the problem set by modern industrial productivity require for stability one of two things: first, a continuous expansion of credit media of exchange in keeping with the energy used in production, as measured by man-hours or kilowatt-hours, until labor and industrial capacity are fully employed—that is, up to the point where inflation begins; this means a stable price level, which indicates that consumption and production as a whole are in balance. The alternative is some systematic means of converting surplus purchasing power into consumption without increasing productive capacity —by a combination of appropriate taxation and public borrowing, using the proceeds for public services of non-competitive character.

Neither of these conditions is fulfilled under the controls that exist in the capitalistic system at present. Instead what happens is this:

We have periodically—largely under influence of international forces—gold or credit inflows, a process of credit expansion which runs into inflation because of defective banking and investment systems. In the latest form, as seen in 1922-29, we have an excess of previous savings, swollen by large profits, supporting and supplemented by a pyramid of capitalized bank credit transformed into consumer purchasing power principally through expanded construction of productive capacity, partly through installment sales of goods, and partly by leaks over into consumption via spending of speculative profits. The consequent rise in prices during the process and before the productive capacity comes into use, constitutes a con-

cealed confiscation of capital as the real value of dollar return on capital falls and the burden of fixed debt diminishes.

It is becoming more difficult to determine definitely on which side—consumption or saving—the balance of loss occurs during inflation periods. On the one hand, the modern investment machinery makes for accelerated speculative profit which in part only can be actually reinvested and tends to overflow into luxury consumption, but is fully offset by speculative losses during subsequent deflation. Actual investment of savings or profits or credit capital shows up in increased productive capacity more promptly and thus tends to depress prices sooner or more continuously. This tends to increase consumer purchasing power more promptly and is reflected in the complaint of profitless prosperity. The expanded application

The probabilities are that we will have at least one more inflationary boom, in which (a) we will give away a lot more goods to the world on credit, and (b) maintain a high tariff to prevent repayment. Banking interests will support the former; industrial and labor interests the latter

of installment selling also tends to turn more of the expanded bank credit into consumer channels. But on the other hand, the investment of savings in construction, under modern methods, involves proportionately less and less labor, so that the conversion of capital into consumer purchasing power in the form of wages becomes less and less effective. Also, with the spread of participation in security speculation among all classes, more and more purchasing power is withheld from consumption and subject to subsequent loss during deflation. On the whole, however, I think the balance of loss tends increasingly to fall on the side of savings or investment even during inflation.

At any rate, when the new productive capacity comes into use production again runs ahead of purchasing power and the decline of prices and depression sets in. The capital savings or credit that have gone into consumer purchasing power during the boom are then registered on the investors' books as losses—written off—by the depreciation of inventories, of security values, by defaults, moratoria, and business failures. There is an additional direct conversion of capital or saving into consumption as bank deposits are drawn upon for current needs. Foreign loans made during inflation periods, not offset by balancing imports of goods, are another phase of capital waste, since the proceeds are really paid out to domestic workers and losses borne by investors during depression. All this is, of course, a vast redistribution of purchasing power in which capital is dissipated or changes hands at reduced value, but in the meantime the difference has in large part passed into consumption during the boom. When the profit requirements or overhead are sufficiently reduced to be met out of the current level of purchasing power, plus consumers' savings, business recovery begins and the cycle starts again.

During the depression, labor, of course loses by unemployment and lowered wages as much as or more than it gained in the transformation of capital during the boom; but this is offset in part by lowered prices and in part by diversion of capital funds into consumer purchasing power through private channels of charity and public channels of borrowing and taxation for unemployment relief. So here, too, it is probable that the balance of gain is on the side of the consumer and of loss on the side of savings, so far as the money accounting goes.

This process does work out on the whole and after a fashion to the extent that it does result in a continuous dissipation of capital and confiscation of savings and profits to the end that consumption in the long run is balanced with output. The cycle is essentially only a phase or aspect of the process of diffusion or distribution of purchasing power in capitalistic society. That process is continuous; booms and depressions are only an extreme or special manifestation of it. Year in and year out, in all phases of the cycle, consumer expenditures run ahead of the national income by a practically constant percentage which represents the chronic wasteage or degradation of capital, that is, its reversion to consumer income. That is the only way competitive capitalism gets along at all.

But obviously, in this economic organization, this is a very disturbing and increasingly dangerous process, even though one cannot be sure of oneself in calling it wasteful. There is, of course, the obvious loss or waste of unrealized potential productive power during depression, which implies a slower rate of progress in terms of rising standards of life. But whether unrealized productive power can be called waste is a question. More immediately serious are certain consequences that threaten to disrupt the structure and organization of the system. These are essentially psychological. First, the cumulative sense of insecurity which this cyclical process of capitalistic confiscation sets up in both investors and workers has become a powerful force preventing the smooth operation of the financial mechanism on the one hand and the industrial on the other. Hoarding in all its forms, capital strikes, flight of capital all threaten a complete breakdown of the banking system; and the sense of insecurity in the worker profoundly affects consumer demand, regardless of purchasing power or prices, and so threatens the very existence of organized large-scale industry. Finally, of course, this sense of insecurity sublimates itself in social aggression, political disturbance, and international conflict.

So, no one can safely recommend this process as a permanent scheme for solving the essential economic problem involved. Competitive capitalism must be recognized as an essentially unstable system, bound to be transformed in one direction or another. The underlying problem is, what direction?

Stability Still Afar

Our immediate problem of stablization in its national aspects is to deal with the transition phase, the period of perhaps twenty or fifty years, that lie ahead. Let me say, parenthetically, that I see no permanent results for stabilization from this depression. It will be followed by at least one and possibly several booms in the grand style of the last, perhaps shorter and sharper, but not essentially different. Nothing in the situation as regards essentials of stability has been changed. We have merely accumulated the makings in this country of another

inflation on a vast scale and nobody will stop it. We may have some changes in our banking system, but these will only help intensify the instability, not control it. We may also have some attempt to pluck a few feathers of profits from the capitalistic goose to make some slight cushions for labor through unemployment insurance reserves, but these will not be adequate to deal with the essential problem of balancing consumer purchasing power with production.

Undoubtedly, the next cycle or two of boom and depression will be distinguished only by a more intensive drive toward social legislation in all its forms—that is, legislative schemes for ameliorating or easing the strain of unbalanced production and absorption upon employees by diverting a part of excess savings into indirect consumption in the form of free social services. But this will involve greater centralization, intensify the concentration of industry, and run counter to the fundamental physical and psychological conditions and economic requirements of stability. It will tend only to run to state capitalism, solidify further the centralized capitalistic structure already too rigid, and cause its catastrophic collapse and disintegration instead of the slow transformation that is desirable. In any case, it cannot make for stability—save in the sense of petrifaction.

In this period, too, we may have—as we have had during this depression—a great deal of lip-service to the slogan of "planning." Some of this will be sincere, and in certain restricted aspects, successful effort in individual concerns; possibly there may be some vague gesture toward it on a national scale by setting up a sort of economic council of stuffed shirts supported by a staff of slide-rule operators; but probably most of this will pass out of the picture in the next boom period.

At any rate, the only possible or probable application of the planning concept will be in industry, through the trade organizations for the purpose of negative stabilization in the sense of production control and price fixing with employee protective measures thrown in incidentally as a sop to labor and suspicious legislators. This "planning" a la cartel is an extreme symptom of capitalistic self-defense. It has for its essential purpose to check the process of competitive confiscation which is the only automatic safety valve by which the survival of the system is assured; and it further tends to sterilize the element of technological improvement implicit in that process. Moreover, it inevitably implies an intensification of centralization, and so cannot prove to be of any permanent importance because the undercurrent is in the opposite direction.

But, quite apart from the fact that the fundamental forces that have set in are opposed to industrial centralization and concentration (nationally as well as internationally), and also apart from the fact that idea of deliberate production control or organized sabotage sanctioned by law is fundamentally fallacious, there is a more immediate and obvious weakness in the concept of planning as applied to industrial management. This lies in its naive assumption that industrial management or organization per se can have any effective influence on the business cycle, everything else remaining the same. As a matter of fact, I see no evidence at all that this depression was due in any measure to defects in industrial management, except possibly for some slight follies in financial policies of corporations, for which they were not to blame in the first instance. Nor do I believe that there is anything of vital importance that industrial management itself can do to prevent catastrophes of this sort. The truth is that your cycle starts in forces that lie almost wholly outside the sphere of influence of industrial management, and no stabilization effort is worth discussing seriously which does not deal with them first.

These forces—those of inflation and deflation—center in the price level, and they originate in and can be controlled only through the financial system in the broadest sense, not through the industrial structure and its operating management. The utmost that industrial management does is to play into them and intensify them in a moderate degree. By the financial system I mean, first, the private banking organization, including the regular banking structure, the investment banking system, the brokerage business, and the security exchanges; second, the governmental fiscal machinery, including the tariff.

The cycle is a financial phenomena, not an industrial affair. The best proof of this is not that we did not have depressions before the modern credit system, but that we did have them before the industrial system

All these together, and not any policies of industrial management, control the relation between saving, investment, and spending which determines the flow and distribution of purchasing power, the distribution of wealth, the balance between production and consumption, the price level, and the relation between creditor and debtor groups. Out of these relations the business cycle issues.

Until this is recognized, we shall make little real progress toward stability. The first and most important step toward stabilization is the social control of our financial machinery. And I believe that if this is done, almost nothing else is necessary. Given effective control of our banking system and fiscal policies, industrial management and organization may be left almost complete freedom—and the greater freedom the better. They will be able to do little damage, and the urge of individual initiative will induce advancement. In the end, such initiative will serve as a constant check on concentration—which is the outcome of financial factors—and conform to the fundamental tendency to decentralization which is implicit in the physical factors underlying our economic evolution. This itself will make for greater stability.

The immediate approach to stabilization, therefore, lies along the lines of credit control and fiscal policy, not of industrial organization and planning. This is the more difficult approach because industrial planning, as at present conceived, really plays into the hands of vested interests—of creditor groups, organized labor, and governmental bureaucracy—while credit control and fiscal engineering involve violent conflicts with them. The essential significance of the Soviet experiment is not its effort at industrial planning, which has serious weaknesses, but its decisive attack on the credit problem. The greatest handicap of capitalism is its archaic and ingrown credit and monetary system; that of communism is its inexperience in machine technology and industrial

management. These handicaps are both serious enough to make the two systems about equally matched; but machine operation and industrial management can be learned; improvement of the credit mechanism is essentially a problem of class struggle, Britain has begun to realize this and it is the submerged issue in British politics today.

Socialization of finance in its essentials within the framework of the capitalistic system of free industrial enterprise appears almost impossible without profound political upheaval, because the forces opposed to it are so powerful; but I believe there is some promise of slow improvement, aided by the pressure of physical or technological influence now at work. This depression,

The direction of Communism or any of the many forms of centralized socialization is not the way out. These are fundamentally as unstable systems as present-day capitalism. Forces, purely physical in character, will determine the form of the stable system that will eventually evolve

and the banking fiscal situation it has given rise to, afford an unparalleled opportunity for fairly rapid progress if those who understand the problem will only organize to take advantage of it.

Strengthen the Federal Reserve System

It is useless at the outset to work for any outright nationalization of our central banking system. Even in England, where the banking structure is simple, this is recognized. Public opinion is not ready for it nor are we technically prepared for governmental banking operation. Moreover, powerful private banking and investment interest are opposed to any such experiment and will be able to frighten the public, and if necessary sabotage any steps in that direction in very destructive ways. The fact is that the basis does not exist as yet for any direct governmental control over banking and investment. There really is on such thing as the Federal Reserve System, as a central banking organization. The idea is implicit in the Federal Reserve Act, which is the most important piece of economic legislation ever passed in this country, but its framers were frustrated from carrying out it full intention, by the influence of special interests. We have only a system within a system, a group of powerful private metropolitan banks which control both the Reserve banks and the mass of smaller member banks throughout the country. They are the real sources of reserve credit; they are closely tied up with the securities markets; they dominate the money market; they control the only important Reserve Banks; and the mass of small member banks throughout the country are utterly dependent upon them, in loose ways not controlled by law, for access to reserve credit resources. Through their security affiliates, their holding companies, their chain and branch banking systems, which they are insistent on spreading, they have established on effective but invisible centralization of credit control. This control is exercised almost solely in the interest of the security markets, domestic and foreign, and not in the interest of domestic business stability, or the security of depositors. The ineffectiveness of the Federal Reserve System in this situation is sufficiently demonstrated, I think, in the fact that in such conditions as have arisen in this depression—a practical collapse of our credit machinery throughout the country—the nominal Reserve System is practically set aside, the inside, concealed reserve system is brought into the open as a National Credit Corporation; and, as will be seen when Congress assembles, it finally becomes necessary for the government to set up entirely separate and new reserve credit agencies by reviving the War Finance Corporation, as an emergency national banking institution.

The first step toward stabilization must be the strengthening of the Federal Reserve System so that it may meet the credit needs of industry and trade in the democratic way in which it was intended to serve them. This requires revision of the Reserve Act, first, so as to insure greater security for bank depositors and prevent the possibility of repetition of that collapse of confidence in our banks which has so seriously crippled the country during the latter stages of this depression; second, so as to insure greater independence and more democratic access to reserve credit resources on the part of the individual member banks throughout the country. These purposes require complete and compulsory inclusion of all commercial banks within the system; establishment of insurance reserves within the Reserve Banks to guarantee bank deposits; the widening of the provisions and regulations regarding the classes of assets eligible for rediscount. All these things parallel the proposals of the Swope plan for establishing unemployment reserves to protect workers and for strengthening the trade associations, but seem to me of much greater importance for business stability.

In addition, certain specific changes are necessary to secure greater control over the money and securities markets in the social interest. The security affiliates of commercial banks should be separated by a Caesarian operation. It should be made definitely illegal for member banks to engage in selling of securities either directly or for trust accounts; possibly the trust functions of commercial banks should be more strictly controlled or likewise divorced. Their handling of corporation funds for load in the call market without contingent liability should be controlled. Finally, it will be necessary to establish a separate system of reserve credit resources for rediscounting intermediate and long-term loans to industry, trade, and construction, similar to the intermediate credit and land banks for agriculture. The functions of the Federal Reserve System as it stands should not be complicated by taking on these additional essential tasks.

Stabilization Through Taxation

These changes will make for greater business stability by providing a more elastic and controllable credit mechanism without resorting at one swoop to socialization of our banking system; but moderate as they are they will meet bitter opposition from private banking interests and will mean a long and bloody battle before they are achieved. There is more immediate promise of progress

in the other half of the picture—that of fiscal policy. This is not only inseparably connected with credit control, but it is an important independent weapon for promoting stability. In fact, although I attach great importance to improvements in our banking system, more can be accomplished quickly toward stabilization by appropriate improvements in our fiscal system than in any other way.

The problem of balancing production and consumption with which the industrial planners are preoccupied is essentially one of increasing purchasing power for consumers' goods, rather than of curtailing output. This can be met indirectly by continuous controlled credit expansion, but this requires changes in our banking system and psychology which will be difficult to achieve, fundamentally because it involves a continuous, concealed confiscation of claims to income through inflation. Moreover, even though this difficulty were overcome or disregarded, it must remain doubtful whether we can successfully or accurately finance consumption by the indirect process of financing production, for which our banking mechanism is primarily designed. What we need primarily is a direct diversion of savings, investment funds, or credit capital from competitive production into consumption. We do not have to destroy profits by the wasteful process of competitive confiscation; we need only assure ourselves that they will be properly used. This result can be attained more quickly and directly by use of the taxing power than in any other way. Taxation is the most powerful weapon for redistribution of wealth and income ever devised, and by that token it is the most effective agency for stabilization. All that is required is courage and intelligence in its use.

We can, if we wish, quite simply and easily prevent over-saving, over-investment, over-expansion of productive capacity, without waiting for this purchasing power to be confiscated by competition, inflation and deflation in the cycle of boom and depression, by taxing away with suitable individual income surtax rates and inheritance taxes all excess corporate savings and surplus individual income that cannot be spent by the recipients on consumers goods or replacement of obsolescent equipment, and spending this surplus through governmental channels for the production of free social income by building public works, parks, museums, recreation centers, roads—all of which do not offer commodities or services for competitive sales, and in the building of which purchasing power for other goods is directly released in wages.

The fascinating prospects and paradoxes opened up by this concept of using the taxing power as an agency of wealth and income distribution and business stabilization—its influence on employment, leisure, industrial activity and profits, its relation to obsolescence and technological advance, its bearing on economic decentralization, on international trade and finance—are too large and complex to elaborate here. No other approach offers quite as simple and certain way of assuring business stability and rapid rise of living standards in a highly developed country within the capitalistic framework as this. That through centralized industrial planning seems to me largely irrelevant, psychologically impossible, and contrary to fundamental technological tendencies. The approach via credit control is difficult, vague, abstract, uncertain, though ultimately very important. That through fiscal policy is concrete, accurate, and easily amenable to the engineering attitude.

It is useless to indulge in dialectic debate as to whether these lines of approach are socialistic, communistic, or capitalistic. These terms no longer have much concrete significance to me. The ultimate economic organization of society is going to be essentially capitalistic in structure, after a perhaps prolonged period of confused and futile experiment with socialistic centralization and control in certain aspects.

Let me touch upon one other aspect of stabilization in which both capitalistic America and Soviet Russia have failed. That is the psychological aspect. However each of these systems may meet the strictly economic problem of balancing consumer purchasing power with production they must remain, as they now are, essentially unstable systems so long as that problem is met in ways which do not satisfy the instinctive necessities of the individual. We may define those necessities in many ways, for the creative energy of men has many direct and indirect expressions; but the essential necessities are summed up in simplest terms in the complementary concepts of security and freedom. In both systems the emphasis of the economic approach has increasingly come to be on security, to which freedom is being sacrificed; and it is this fact that renders them essentially unstable.

Beneath superficial systems of increasing centralization and concentration of control, there is a definite drift toward diffusion of industrial activity, which will ultimately emerge in a simpler economic structure, making for greater self-sufficiency, increased economic activity, increased individual creative satisfaction, and greater stability

Without carrying the comparison any farther, it is clear to me, at any rate, that capitalism is being transformed more by force of the necessity of offsetting the frustrations of freedom than by the necessity of assuring economic security. At present we stabilizers are preoccupied with the problem of removing the sense of economic insecurity, because we see that it is very disturbing to highly organized and centralized industry. We do not yet recognize that this sense of insecurity itself is only partly and superficially the result of economic unbalance, and that it is the expression of deep-seated and far-reaching frustrations of instinctive necessities of the individual quite as important as his economic needs. We must learn for example that the instability of consumer demand which arises from the sense of insecurity is the outcome not only of *unemployment* but also of *employment* under modern conditions.

The Unemployed

What Shall We Do With Them?

JAMES W. HOOK

President, The Geometric Tool Company; Chairman, Connecticut Unemployment Commission; Member of the President's Organization for Unemployment Relief

A complete plan for unemployment relief that will appeal to business executives and operatives because it is practical, fair, and distributes the burden where it logically belongs

FOR more than sixteen months, a certain New England manufacturing company has been making a detailed study to determine the precise effects of the depressed state of business upon the wages and hours of employment of each of its employees. This study has been explained fully in previous articles and a plan of unemployment relief growing out of it was suggested by the present writer early in August.* The purpose of this paper is to elucidate that plan and outline its details.

General Outline of the Plan

The plan is based upon the principle that the unemployed naturally group themselves into three classes; namely, the unemployables, the casual and nomadic workers, and the stable employees.

The unemployables must be cared for by charity as at present.

The casual and nomadic workers must be provided for during periods of unemployment crises by work relief supplied by forwardly planned public works.

The stable employees must be assisted by the employer through the medium of reserves set up during prior years and used during periods of low employment, to maintain a reasonable portion of normal income of those falling within this classification and for paying liberal

*An address delivered at the First Conference on Management Problems of the Smaller Industries, at Silver Bay, on Lake George, New York, August 10-15, 1931, and printed in the October Issue of Mechanical Engineering, 1931.

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A native of the state of Iowa, Mr. Hook graduated from Iowa State College as mechanical engineer in 1905. In 1912 his alma mater awarded him his master's degree for original work done. From 1906 to 1909 he was engineer for the Globe Machinery and Supply Company, Des Moines, Iowa; from 1909 to 1916, sales manager and general manager, C. A. Dunham Company, Marshalltown, Iowa. In 1916 he came to New York to become vice-president, president and director of the Allied Machinery Company and was prominently identified with the large war activities of the American International Corporation. In 1923, he acquired a controlling interest in The Geometric Tool Company, manufacturer of precision threading tools.

Mr. Hook has written many articles and addressed many important meetings on various phases of industrial work.

dismissal wages to those who are dropped from the payroll entirely.

The plan also provides for death benefits to the stable employees and suggests ways and means of assuring that all employing units will set aside like percentages of reserves so that all employers will be on an equal competitive basis.

Analysis of the Unemployed

Quoting from the earlier presentation, the three classes of the unemployed were accounted for and described as follows—

"25 per cent of the unemployed are unemployable.

"35 per cent are what might be termed unstable or nomadic workers—men and women who do not want continuous employment; who desire to work one place in winter and another place in summer; who like to flit about from place to place and from job to job. Many of them are alien casual laborers engaged in construction work in the cities, on the railroads, and on the farms—workers who produce the enormous labor turnover figures in industry during periods of prosperity. It is they who are most benefited by municipal appropriations and bond issues voted for unemployment relief.

"The remaining 40 per cent are stable employees—loyal men and women who are settled in their habits and want to work; who are raising families and building homes; who have established positions in the community and adopted standards of living that they desire above all things to maintain. They are absolutely essential to the success of industry in normal times. It is a serious matter to them, to industry, and to the community in which they live, when they are thrown out of employment."

The Plan Is Attainable and Comprehensive

The plan met with favor, first because it is attainable, and second, because it is comprehensive, providing for all who are out of work in a way that would spread

There are three classes of unemployed: The unemployable, the drifter, and the steady worker. The responsibility for the first lies with charity, for the second with government, and for the last, with industry. Handled thus the burden of each is light

the burden equitably upon all society. It adds nothing to what charity is already doing, proposes that government pre-plan and provide work relief in an intelligent and practical way, and calls upon the employer to assume the limited responsibility of providing relief to his real employees, ones who are absolutely essential to the success of his business and who represent a settled and important part of the community. The American people are not averse to shouldering any reasonable social responsibility, provided it is fairly distributed. But to attempt to put the whole load of unemployment relief upon any one group would be resisted by that group and if persisted in would portend its destruction just as has been the case in England and Germany.

The Detailed Plan

No, the burden must be spread where it rightfully belongs—partly upon institutions, public and private, organized to administer charity; partly upon the different units of government who would supply work relief through the medium of forwardly planned and financed public works; and partly upon the employer who would determine who his stable workers are, spread available work between them when business is slack and augment their incomes, if necessary, by funds set aside during prior years. With these principles as a guide let us work out a detailed plan.

FIRST: Every community should have means for administering funds provided for charity.

Probably every state and local community has some legal provision for the care of the poor. Voluntary

American industry is not averse to shouldering any reasonable social responsibility, provided the burden is fairly distributed

efforts are also made, more or less effectively, in most communities through agencies variously organized. The procedure, traditions, and legal requirements underlying the conduct of these public and private relief agencies make a generalization as to their operation difficult if not impossible. One requirement, however, that should be insisted upon at all hazards is that the work of both, or all should be thoroughly and effectively coordinated. This could be brought about by mutual agreement between the different agencies, by a council of social agencies, or by special committees set up either as a normal part of the community organization or as a special measure for unemployment relief. In the development of these cooperative measures character building activities should not be overlooked. These are most important as a means of preparing and encouraging under-privileged persons to take care of themselves.

There should be a social service exchange or central index to prevent mistakes in planning, and duplication and waste of effort. Relief for any given family should be supplied by one agency only, whether public or private, in amounts sufficient to meet necessities, with the understanding, of course, that in times of depression the adequacy and standard of such relief for the unemployed must be on an emergency basis. Except in unusual circumstances, relief should be given in the form of orders for necessities and not in cash. Orders for food, so far as possible, and particularly where young children are the beneficiaries, should provide a balanced ration. The giving and use of these orders should be carefully safeguarded by investigation, supervision, records and bookkeeping. With relief organizations of this kind functioning in each community, supported by public and private funds and effectively managed, the first group of the unemployed, the unemployable, including the sick and the unfortunate, should not suffer.

SECOND: Each community with a population of five thousand or more should have a public planning board made up of public officials and private citizens.

This board should plan in advance to supply work, during periods of depressed business, to the second group of the unemployed—the casual and nomadic workers. Most of the larger cities, and many of the smaller ones, already have such boards. Mostly, however, they deal in plans for immediate use or for an indefinite future. They should also be required to plan for periods of depressed business.

Over a period of seven to ten years that elapses between two major depressions literally dozens of proposals and programs for city improvements pass over the desks of city officials. Most of them are discarded and forgotten, not wholly because they lack merit but because the officials know that they would not be approved by the Board of Aldermen, or even the voters. The result of this is that when an unemployment crisis comes and money is appropriated for relief it must be spent for makeshift jobs that the worker himself knows full well are of no economic value.

England is an example of the fact that general government cannot successfully administer direct relief. Germany's financial condition is a warning that government cannot expect industry to carry the entire burden, if it intends to compete in foreign markets. The dole would upset the industrial structure of any nation

Forward planning of public works that can be deferred for purposes of unemployment relief has great possibilities. Even if it is difficult to find enough projects to absorb all of the unemployed local labor, it must not be forgotten that materials purchased for any work supplies the need for human labor some place in their replacement. And local business improvement is dependent, for the most part, upon general improvement in the country and world as a whole. Thus is emphasized the tremendous importance of public funds appropriated for unemployment relief being spent on projects of sound economic value. Funds spent otherwise, in the final analysis, represent wasted wealth in that they are consumed in the form of consumers' goods without a corresponding value of capital or consumers' goods being created to take their place. Every dollar, therefore, that is paid out that does not yield value in return, goes to reduce the wealth of the world. Moreover, dollars spent in this way tend to demoralize the recipient himself and make him a dependent creature, who thinks the world owes him a living regardless of whether he tries to help himself or not.

Public works must always be depended upon to augment the private building industry. During periods of depressed business they must also supply opportunities for work for the day laborer who shifts from job to job and employer to employer, the chronically tired who likes more than one day of rest in seven, and the tramp tradesman who has the ability but not the temperament to remain permanently on one job. If public works are not made available, then a dole in some form for this group is the only alternative, because there is no other work to do.

THIRD: Every employer of labor should accept the responsibility for assisting his stable employees — the third group of the unemployed—during depressed periods of business.

Who are the stable employees? This, each branch of industry should determine for itself. As a general proposition, they are the employees, including both salary and wage-earners, who have been continuously on the payroll a year or more. Special consideration should be given to other employees who can be shown to have been a resident of the community for two years or more and a steady worker during the entire time in not more than three places and dismissed for bad conduct from none. To become a stable employee should be a distinction worth trying for, but the details of attaining and maintaining that status must not be such as to impair the individual's freedom to better himself. For that reason stable employees should attain the distinction by designation of the employer as well as by length of service. A continuing record should be kept by each employing unit to show from month to month who its stable workers are.

Seasonal Workers

Where a company has seasonal work to do and is in the habit of drawing upon the reservoirs of labor for limited periods during the year, provision should be made to maintain a percentage equal to 60 per cent of the wages paid by the company to seasonal workers, whether identical or not, during the previous year. This would be accomplished by spreading or staggering work, or shortening hours.

Employment Reserves and Benefits

When the stable force and rules for admitting new members to it have been established by a competitive industry (as hereinafter suggested) a cash reserve fund for augmenting its income during periods of depressed business, paying dismissal wages and providing group life insurance, should be established. This reserve should be called the "Employment Reserve" and should be set aside for the following specific purposes—

1. To augment the income of stable workers whose earnings, calculated on an annual basis, would amount to $4,000.00 each, or less, so that their weekly incomes would not decline more than 40 per cent for those with dependents or 60 per cent for those without during any twelve-month period, except in cases of—
   - A. Voluntary absence, resignation from the company, or death.
   - B. Dismissal that would require payment of dismissal wages as described below.
   - C. Involuntary absence that would be compensable.
   - D. Absence because of strikes or labor difficulties.
   - E. Absence for disciplinary purposes, and
   - F. Absence for non-compensable illness, in which case benefits should be paid at the rate of not more than half pay for ten weeks beginning after an absence of fourteen calendar days. No benefits should accrue for the first two weeks and payments thereafter would be made only upon doctor's certificate. If, after a siege of compensable illness, the afflicted must be dismissed

entirely, then he should receive a dismissal wage as hereinafter described in addition to illness benefits already received. Dismissal wages should also be paid to those who are dismissed on account of compensable illness or affliction.

2. To enable companies that have seasonal work to do, to maintain their wage bills for that class of workers at 60 per cent of the amount paid during the previous year.
3. To pay dismissal wages to stable workers, except when dismissed for bad conduct, at the rate of half pay for a period of twenty weeks for those who had been in the employ of the company twenty years or less, and two additional weeks for every year of service over and above twenty years.
4. To pay premiums on group life insurance in the amount of $1,000.00 for all employees who had been on the payroll a year or more.

The benefits stated above are, of course, only tentative to illustrate principles. Other figures could be substituted.

The Reserve Must Be in Cash and Trusteed

The reserve should be set up in cash as a percentage of total payroll and trusteed under definite provisions that would obviate the possibility of its being used for other than the above purposes. It should be checked monthly with the record of stable employees to determine its adequacy.

To lessen the work of the trustee, the employer should be permitted to certify payments chargeable to the reserve once each month and to be reimbursed from same in one lump sum. The trustee should be authorized to make such audit and examination of the certification as may be necessary to detect misuse of the funds or error.

Overcoming Competitive Disadvantage

In order to overcome competitive disadvantage, means would have to be provided to assure that all units in a competitive field should follow the same rule for determining who their stable workers were (with and without dependents) and setting aside proportionately the same minimum cash reserves for unemployment relief. This should be accomplished through a conference of the leading units in each competitive field called for the purpose by the United States Department of Commerce precisely as was done by that same department when it brought competitive groups together to consider and agree upon simplification. In all cases the division of an industry establishing reserve percentages and rules for determining who its stable workers were should be required to appoint a permanent rotating committee, just as happened in the simplification movement, whose duty it would be to advise with members of the group, receive and consider petitions for increases and decreases in the reserve percentages and changes in the methods and rules governing their application, and to do other necessary advisory work. So far as possible this committee should work through an existing trade association and maintain a close cooperating connection with the Department of Commerce.

Between depressions, many meritorious projects are tabled by Municipal and National governments because they are not approved at the moment. Such work should be fully planned during good times, and carried out in times of depression

What "Super board" would have the capacity to master the enormous detail of American finance and business, and what business man or stockholder would be willing to depend upon it for his economic future?

Governmental participation in this plan is assigned to the Department of Commerce; first, because it has the confidence of employing units; second, because it has had experience in guiding voluntary action on the part of industry through its simplification program, and third, because it is in possession of facts pertaining to all phases of industrial activity, both at home and abroad.

Basis for Calculating the Reserve

In order that some basis for accruals might be arrived at, the reserve should be based upon the arbitrary theory that a major depression equal to the present one will come once in every seven years. Payroll deductions should begin just as soon as business improves sufficiently to require that all stable employees were back on 90 per cent of full time and should continue for three years before being drawn upon to provide benefits. Thereafter, benefits should be paid as already described. The accruals, besides being based on the seven-year accumulation period, should also take into account those to be provided for—the stable employees—in order that the amount would not be under-estimated. The limiting feature of the dismissal wage and the monthly check of those who were stable workers should render this calculation possible within reasonable limits of error. If, however, it could be shown later that an error in calculation had been made, or if a major depression should come sooner than the stated seven years, and it could be shown that the employing unit had honestly lived up to the requirements as agreed upon, then the funds should be apportioned as equitably as possible. Thereafter the inadequacy should be taken into account and the reserve increased accordingly. When deductions from payrolls once start they should continue without break through subsequent good years and bad, just as reserves for depreciation do at present.

Encouraging Stabilization of Employment

To encourage stabilization of employment and to accommodate cases where for any cause the number of employees in a certain unit of business declines, the right should be given to apply for the privilege of withdrawing excesses of accumulation from the fund. The application, with all supporting facts, should be made to a com-

mittee of the industry of which applicant is a part, which in turn should report its recommendation to the Department of Commerce for advisory opinion and moral backing of the final decision.

Reserves Should Not Be Centralized

It is not contemplated that there would be group centralization or consolidation of reserves. Each employing unit would be required to provide for itself alone the same as it now provides for its own individual tax reserves. There is no more reason for believing that this procedure would be disregarded than that voluntary contributions to a central reserve would be. And decentralization would have important advantages. First it would provide a powerful incentive to each employing unit to overcome unemployment in its own business in order to justify a request for a reduction in its reserve requirement; and second it would tend to spread reserves over a wide field and among many banks and thus simplify the problem of liquidation when benefits must be paid.

Very few changes in existing laws, and still fewer new ones, are necessary to safeguard the plan outlined

It should not be overlooked that reserves for unemployment relief would have to be converted into cash at the beginning of and during depressed business periods. If they were centralized in large sums their liquidation would re-act seriously upon the financial structure tending further to depress prices, increase bank failures and prolong the depression.

Where a Company Goes Out of Business or Consolidates

Where a company goes out of business for any cause the fund accumulated to date should be used to pay dismissal wages, as far as they will go, to those who are thrown out of employment. Any balance over this requirement should be returned to the stockholders.

Where a company consolidates with another, the fund of both companies should be drawn upon respectively to pay dismissal wages, as aforesaid, to stable workers and assist seasonal workers above defined who are thrown out of employment. Any balance left over should be consolidated into one Employment Reserve for the resultant company.

Enforcement of Plan

Once the reserves and rules governing their uses were agreed upon they should form a code of standard practice for the industry in question and receive the approval of the Department of Commerce. Thereafter, backsliding on the part of any individual unit in the group would bring forth the censure of the industry directly affected, other industrial groups and of government through the Department of Commerce. Industry, itself can provide very effective penalties if it can feel assured that it will not run afoul of the government when it applies them.

Legislative Requirements and Studies

The Federal Trade Commission Act and other Acts should be amended to permit employing units to cooperate in the matters of providing uniform Employment Reserves, standardizing other reserves within competitive groups and stabilizing production.

Laws to penalize those who should misuse or misappropriate employment reserves should be enacted by the several states.

The provisions of the State and Federal Income Tax Laws should be liberalized to permit deductions of Employment Reserves from net taxable income the same as is done now with reserves for depreciation, obsolescence and losses on account.

Studies should be made to determine if it would be wise or proper for State and Federal Governments to reduce taxes of those providing Employment Reserves or otherwise assist them by the return of certain amounts of tax money to be added to the Employment Reserve Fund.

Should Employees Contribute to the Employment Reserve?

The question of who should contribute to the reserve fund during the period of its accumulation is important. It would simplify matters very much to omit employee participation, since it would obviate the necessity of shifting of funds if an employee who had been contributing should quit work or transfer his employment to another company. Realizing how employers generally feel, however, and taking into account the effects upon the employee himself, this plan recommends that contributions be made equally by employer and employee with the provision that all employees should begin to contribute at the moment of their employment and that in case of their subsequently leaving, the amount contributed by them, over and above one-half the benefits to which they would be entitled, plus interest accumulations, should follow them either to the company by whom they are next employed, to themselves in case of retirement from active work, or to their executors, administrator, or assigns, in case of death.

While government direction is not desirable, guidance by an experienced government department like the Department of Commerce is essential for organizing such a comprehensive plan

In the event that the employer alone should contribute to the fund, the amount set aside should be for unemployment relief in the company as a whole and none of it should follow an employee who, for any reason, left the company employ in a manner that made him ineligible for a dismissal wage.

Death Benefits

Death benefits should be provided for each stable employee who had been on the payroll a year, by group insurance in the amount of $1,000.00—the employer to pay the entire premium. The employee would be permitted to pay for additional insurance.

Old Age Benefits

This would leave only old age retirement benefits unprovided for, except in so far as the dismissal wage would give temporary relief. These benefits have been omitted from this plan because the writer does not believe that the problem can be solved in that way. Regardless of how universally the principle of old age benefits and annuities are adopted by employing units, the problem would still remain in a very large way. The solution lies fundamentally in the encouragement of personal thrift, the stabilization of employment to insure steady earnings and the payment of wages that will enable savings to be set aside. If the problem does not yield to these methods, then charitable and institutional assistance as at present, or state aid in some form, is the only way out.

"Government cannot properly administer funds for direct relief. Political pressure is too great, group minority interests too compelling. Even in cities and towns direct relief should, just as far as possible, be supplied and administered by private agencies."

Old age benefits differ materially from unemployment benefits in that old age presupposes inability to work, whereas unemployment presupposes lack of work. The former is not remediable by economic law, while the latter is. Unemployment benefits, therefore, can be made effective and yet be limited with reasonable assurance that opportunities for obtaining work will surely come again.

Is Voluntary Action on the Part of Employer Probable?

In presenting the above plan only bare details have been outlined. Elucidation of many of the points is, of course, possible and desirable. Some will wish that it had recommended more definite governmental action. They will say, and with some justification, that the several branches of industry cannot be depended upon voluntarily to provide Employment Reserves even if permitted and assisted by government to do so.

Uniform voluntary action on the part of upward of a million employing units in the country, it must be admitted, is a lot to expect and if it were proposed that employers must provide for all of the unemployed in this manner, it is quite apparent that it would not be done. But when the direct load on the employer is limited to the stable employees in a reasonably, predictable amount, the difficulties are at once enormously reduced. This plan supplies both of these limitations. In the first instance, it limits the responsibility of the employer to his stable employees and special seasonal employees in certain industries. In the second place, by the provision of the dismissal wage feature, it places the employer in a position to dismiss stable employees in cases of absolute necessity, and at the same time to give the ones dismissed almost as much assistance as is offered to them in other relief plans that have been proposed. The dismissal wage would discourage any employer from dismissing stable workers except as a last resort. Work could decline far below normal in any employing unit before it would be justified in dropping workmen. Yet, it would always have the right to do so in case the business situation demanded it. No employer worthy of the name would say that his stable employees are not the most important factor contributing to the success of his business. None would place plant and equipment, or even stockholders, ahead of them. All would go the limit to provide unemployment relief to them if a way would be proposed that is simple and sound, that has controllable limits and that is supported by the larger units and the more important existing trade associations. The latter should supply the leadership. They need to make haste and prove if voluntary action is possible and practical. There is no doubt of their being successful if the leadership is sincere and the employing units have the will. Both would need to have courage and patience. The plan at first would not function too smoothly. It would need much polishing and those adopting it would have to try whole-heartedly to make it a success, knowing that failure on their part would as surely stimulate government intervention and probable action, as would have been the case had they made no voluntary effort at all.

Governmental Action Should Be Avoided

Governmental action should be avoided if at all possible. A Federal Unemployment Insurance Law, financed by income taxes, would put a terrific burden upon the provident and thoughtful employer to pay benefits to the workers of those concerns that give no thought to social needs and feel no responsibility to the people who work for them. The taxes would be paid into a central source and disbursed mechanically and without regard for worthiness of applicant. Companies would feel no urge to stabilize employment and many would quickly lose all sense of responsibility toward their employees. And regardless of how sound the legislation might be at the beginning, it would soon be revised and extended, as was the case in England and Germany, until its burden would become unbearable.

"The employer whose product consists of 90 per cent material and overhead and ten per cent labor would have no objection to being taxed on his payroll. But it would work an injustice to his neighbor who had 90 per cent labor and 10 per cent material."

If, however, governmental action must come, it is desirable that it should take a direction of legalized and standardized reserves which would force upon each unit of all industries, or any industry, the necessity of setting its own house in order and providing its own employment and other reserves.

Causes of Depression

But let us hope that governmental action will not be necessary. Let us hope that whatever needs to be done will be done voluntarily by communities, local governments and employers themselves. Let us hope, also, that out of the welter of experiences that the world is now passing through a way will be found to prevent, or at least control, the mooted business cycles with their attendant booms and depressions. It has already been argued by some that instead of planning for depressions and expecting them, that more time and thought should be devoted to identifying causes so that their coming might be prevented. Causes, of course, are the fundamental things. But only by dealing with the illness itself can we hope to stimulate thought and research into this illusive field. Curtailment of buying of the products of machines and labor is the broad underlying cause. But what brings that curtailment about is not so easy to define. Something happens, surely, to move the human mind to caution and desire to save. Evidently it is fear for the future, fear of reduction or elimination of income and fear of unemployment. But why this fear? Thousands have answered, but the voices have not been the same. Banking policies, debt expansion, over-production, under-construction, excessive capital expenditures, inflation and over-speculation, and war debts, have all been accused. As for myself, I am pretty much confused and wonder if in the last analysis all of these factors are not involved along with many, many others unmentioned and unthought of. I shall mention but one culprit that, in my judgment, has had far greater influence than has been accredited to it in our individualistic, democratic economy. It is unbridled competition which probably does more to drive wages to bare existence levels and cause over-production, and credit and debt expansion than anything else.

The manufacturers of machinery must be brought together for agreement upon uniform reserves for their industry. Other industries or possibly in some cases branches of industries, must also agree upon their reserves

Standardized Reserve Accounting and Uniform Costing Methods

I believe that it is inimical to the public interest that some of our important industries are on the ragged edge of destruction all the time, simply because they cannot persuade their different units to take into account all well-known items of cost when determining selling prices. One concern in an industry, by failing to use a correct base of costs, can seriously affect the stability and wage policy of the whole industry and continue to do so for months, or even years, as it goes down and down into slow failure and final oblivion. We cannot stabilize industry and solve our wage problems so long as such conditions are permitted to exist. Neither can we make sure that reported earnings of corporate and private enterprises are real or inflated, unless we know that the costing policy of the enterprise is sound. It should not be possible for any business institution to report profits before deducting honest and reasonable costs. Material and labor are easy to ascertain. Depreciation and obsolescence are somewhat less tangible and are often disgracefully manipulated in order to fool someone into the belief that the concern is making profits. Standardized reserve accounting and uniform costing methods would militate against these evils. Shouldn't government, whose interest in profitable business is paramount, permit and encourage these desirable practices? By so doing it would help to protect the cost base of merchandise and commodities so that business could compete on the basis that it ought; namely, skillful management and high quality of service and product.

Business Stabilization

Stabilization of business, involving the control of production and regulation of consumers' demand, is another matter in which government should be vitally interested. The first step in its accomplishment awaits the call of government for all units in each competitive field to meet in Washington for the purpose of discussing matters of mutual interest. Sound decisions growing out of these meetings should be applauded and given the moral support of government. A precedent for this has already been established. When the simplification movement was started, a department of the Federal Government assumed the leadership, called competitive groups together and showed them the way. Results were immediate and far-reaching. Certain businesses, and even certain industries, that were floundering on the ragged edge of failure, were shown the way to profits and success without adding a penny to prices that the public had to pay. Let government foster and encourage an industrial stabilization movement in the same way that it handled and directed the simplification movement. Let it call competitive groups together, so that they may discuss ways and means of controlling production, forecasting consumers' demand, standardizing reserves for depreciation and obsolescence, establishing sound costing practices and eliminating unfair and cut-throat competition that deprives workers of all advantages gained by technological advances and engenders everlasting suspicion and hate between competitors.

National Planning

This is the sort of a national planning program that our government could embark upon with all safety. And in my judgment it would be many fold more effective and succesful than any super board that could be selected. For what super board of human beings would have the fortitude, much less the mental capacity, to master the enormous detail of American finance and business sufficiently to direct its mass movements toward a certain goal? And what red-blooded American citizen, or group of citizens, would be willing to submit his or its economic future to such a directing force? Enforcement of the Eighteenth Amendment would be a picnic in comparison with the enforcement of such an economic dictatorship.

What America needs, with its traditions of democracy and rugged individualism, is not more laws but a considerate governmental leadership that by encouragement and example will teach its peoples and institutions the art and importance of co-operation. Only in this way can the composite mind of the whole people be brought to bear upon the confusing and unyielding problems of the present day, many of which reach to the very foundations of our civilization.

Industry's Responsibility in this Depression—*Discussion*

EDWARD ADAMS RICHARDSON

I HAVE READ with interest and attention the paper by Ralph E. Flanders, "Industry's Responsibility in this Depression," (*AM*—Vol. 75, page 627) and I should like to make some comments.

The Swope plan, which he discusses at some length, contemplates that each industry will concern itself with the gathering of market data and other information of value to that industry. But Keyne, ("A Treatise on Money"), studying the possibility of banking control of booms and, as a result, depressions, complains of the lack of the data necessary for control. Certainly if the banks have not sufficient data for intelligent control, the industries must be even less in a position for intelligent action. The Swope plan, or governmental action, must be extended to furnish those statistics the bankers require which are of importance to all industries. One weakness of the Swope plan is the apparent independence of industries of one another in this and other respects.

Banking control, as normally understood, is limited to varying interest rates, raising them when inflation is occurring, lowering them during deflation. The control is quite insufficient. Economists desire to give the banks power to refuse loans which are so used as to produce inflation, to control and limit bond and stock issues, and the like—as Keyne says, maintain the balance between savings and investment. When this state is maintained, price levels remain unchanged by monetary considerations, and people can buy what they produce.

It is not sufficient that investment be equal to savings. The extension of investment represented by excess capacity is the principle factor leading to booms. Excess capacity and overproduction are not one and the same thing. Overproduction usually results at the end of a boom due to the considerable time required for many goods in process to come on the market, so that, by the time they arrive, the demand is gone and an overproduction exists. Excess capacity is physical plant which cannot be utilized for productive purposes by the available labor supply when fully at work, and must be measured by summing up the number of people required to work all plant capacity to capacity, and comparing it with the available labor supply. The existence of excess capacity leads to destructive competition between the owners of such capacity.

Mass production depends for its effectiveness on operation substantially to capacity. When excess capacity exists, that excess leads to larger forces for sales and advertising, essentially non-productive labor which reduces the savings possible with the machinery and which continues even when business goes to a rival. Such labor costs more per unit than productive labor and often as much as several units saved. Furthermore, the quantity of production is reduced by a shift in labor from production to non-productive work. The burden on the plant may more than offset the machine savings.

But there has been an increase in "service industries" from about 57 per cent of the number in productive industries to over 80 per cent in a few years, a phenomenon of the greatest importance. Prices of articles have not, as a result, been reduced enough to secure sufficient sales. These figures do not include the shift to overhead in the productive industries. This means a heavy burden on the actual producers, for they receive only a small share of what they produce. This leads to displacing men by machines faster than it is possible to place the displaced men, for the demand cannot absorb the product anticipated at the prices. Here is a vicious circle arising primarily from the existence of excess capacity in the sense I have defined.

To be sure, the machine tool industry cannot do much to correct it, and it is little responsible. However, the industry must realize its danger and avoid building plant to meet a demand which cannot be maintained, otherwise it will be in the same class as the industries which mistook the advance in demand of one year through installment buying for new demand.

It is not true that savings should be limited to possible investments, if by investments we think of industrial expansion. When the banks exert their influence to prevent building excess capacity, and their loanable funds increase, the time has come to encourage expenditure on homes, new industries, governmental expenditures, and in other ways. The whole aim is to keep the people at work. Unfortunately, at such times the banks tend to loan at lower rates. They have taken to selling stock and bonds to increase their earnings, and thereby have been led, by self interest, to disregard their duties as bankers and encourage the inflation they should avoid like the plague.

Whenever there is inflation, it takes time to offset the effects of inflation. After that, it takes time to save up working capital. Losses must be written off. Labor can be financed easily, as it earns its pay, a most important thing to consider in devising ways to end the depression. Investment to increase capacity is not warranted. To reduce costs, yes. For new industries, yes.

The question of currency stabilization internationally is not being assisted by tariffs. Without tariff adjustment, we cannot secure satisfactory currency stabilization. Mass production demands wide markets. Mutual interpenetration of countries is desirable. Such interpenetration causes the value of a given class of labor to approach parity in terms of grains of gold. A nation may reduce its labor cost by changing the gold reward as Great Britain has done, and gain temporary advantages, but it cannot become permanently wealthy that way. Nor can a nation afford to balance its foreign trade by lending larger and larger quantities of money. In this connection, it is well to remember that the nations owing us money have not put their populations to work to pay them, a condition on which their own prosperity depends.

If every unit of industry and government in this country will aim to avoid excesses of capacity and will make reasonable provision for its labor forces in times of minor depression, and if our banking system be strengthened so as to supervise the process and wield its veto, we can go a long way toward stabilization.

New Roads to Prosperity

PAUL M. MAZUR
Partner, Lehman Brothers

At the Business Stabilization Session of the recent A.S.M.E. Annual Meeting, around which this issue is built, Mr. Mazur was the first speaker. As he spoke entirely extemporaneously, and as no stenographic record of the meeting was made, this article was prepared, with his kind permission, from abstracts of his recent book of the same title. It covers essentially the same ground as did his address

THE present depression contains incontrovertible evidence that depressions do not necessarily generate their own automatic antitoxins. In the long run, men must reestablish prosperity, if only because the alternative of living in a permanent state of depression is too distressing to be borne without heroic efforts being made to improve the condition. But the long run is no comfortable term for the contemporary generation. However, it is incredible that the world should not be impressed and profitably educated by two years of economic standstill, during which suffering of substantial proportions has been imposed upon millions and from which convalescence seems to be taking years.

Omitting the possibility of a complete upheaval in the social order, and disregarding the important element of time, it is not difficult to anticipate the steps in the process of correction. Unquestionably, we shall muddle out of the mess somehow, if political leadership does not interfere too stupidly with the action of the economic forces involved. Over the months or years, there will be an exhaustion of the supply of raw commodities and finished goods created by the excess production of the present period. The rates of production will continue at a level lower than those of consumption. Deficits

AFTER his graduation from Harvard University in 1914, Paul M. Mazur was mainly interested in questions of distribution and organization. He spent sometime with Wm. Filene's Sons, Boston, Mass., and left that company in May, 1917, to enter the U. S. Ordnance Department. Until April, 1919, therefore, he devoted his time between France and England.

In April, 1924, he became associated with the investment banking firm of Lehman Brothers, New York, and was made a partner of that firm in July, 1927.

Mr. Mazur has contributed articles to Review of Reviews, Printer's Ink, The Golden Book, The Atlantic Monthly, Current History, *and* The New York Times. *He is the author of a number of monographs and of the following books: "Principles of Organization Applied to Modern Retailing," Harper Bros., 1927; "American Prosperity, Its Causes and Consequences," Viking Press, 1928; "American Looks Abroad," Viking Press, 1930; "New Roads to Prosperity: The Crisis and Some Ways Out," Viking Press, 1931.*

in goods will ultimately be created even under a program of economy on the part of consumers. The momentum inherent in demand will sooner or later require the renewal of supply. With a renascence in consumption of even small proportions, return of confidence and the consumer's fear that the existing low prices will not last much longer will constitute factors of general economic revival, including an acceleration of the industrial machine. Eventually business will be re-established on its former basis of activity, and all will seem well again.

Unless some untoward event like a physical disaster or a radical social upheaval or a complete loss of faith in the banks intervenes, 1932 seems destined to be a year of convalescence of the world back to the 1926-1927 status of reasonably good business

Cancellation of the debts born of the war and reborn in the Young Plan would be a desirable conclusion to the Hoover Moratorium. It is tragic that the Hoover Moratorium was as long delayed as it was. And it will be still more tragic if the permanent settlement of the war-debt problem is delayed until the year's moratorium reaches a critical stage in the spring of 1932.

The Tariff and Recovery

The tariff problem, too, belongs properly among considerations of immediate recovery. Supported for generations by the consensus of the public, America's tariff policy has lost a great measure of its popularity since 1929. The voices raised against the Fordney-McCumber Bill and the many doubts raised as to the efficacy of protection as an economic instrument have only become louder and more numerous since the bill has gone into effect. The main reason for this change of sentiment lies in the self-interest of those business men who have begun to feel the adverse influence of reciprocal tariff legislation in foreign markets.

A modification of tariff, however, is simple only in principle. There is little question that radical revisions downward of our present tariff schedules would be of material aid in the recovery of world trade. American markets would be opened to foreign goods. The sellers would create credits with which to furnish the necessary capital to their home industries, enabling them to pay reasonable wages and make payment for past loans as well as future purchases of goods and services, partly and probably chiefly, from the United States. The credit stricture would be lessened and the world's banking systems would operate again upon the basis of the normal exchange of goods. America would participate greatly in the revival of purchasing power and good-will in its foreign markets.

The result, however, would hardly be an unmixed blessing. For some American industries and some American labor the influx of foreign goods would bring increased competition, lower prices, and unemployment. This series of events is the inevitable consequence of selling goods or lending money to debtors who can pay only with their own goods. So, as long as America will seek foreign markets for her goods or repayment of principal and interest on her foreign loans, the same problem of accepting foreign goods and competition will be automatically created. The only alternative is the elimination of all of America's export sales and repudiation by her debtors of a large percentage of their loans. These alternatives are so untenable as to prompt the choice of some other action. But, apparently, they have not seemed sufficiently untenable or sufficiently imminent to have prompted, up to this date, a proper course of action. The present tariff is anomalous and paralyzing. Its modification and essential details must be left to some agency sufficiently possessed of ability and free enough from the need of descending to political compromise to put into effect a practical tariff program capable of meeting the general needs of the American nation and, at the same time, the specific requirements of American businesses.

There is one way in which, temporarily at least, the advantage of foreign markets may be possessed by America without the necessity of a tariff reduction. The renewal of a program of foreign financing for trade purposes, much as it existed from 1920 to 1929, would be reflected fairly quickly in a renascence of foreign trade. In the long run, unfortunately, this program would only increase the amount of goods which America would have to receive in repayment of her loans. Temporarily, the extension of new credits (not such as are extended to enable foreign nations to refund present obligations, for funding short-time obligations, or for furnishing reserves for central banks) would be converted, in part at least, into purchases of needed raw materials from America. The recent sale of wheat by the United States government on long-time credits is an example of this procedure. To date, however, the amount advanced by the United States government in this manner bulks insignificantly against the annual billion dollars advanced by America year after year during the decade from 1920 to 1930. As a permanent measure, there is no merit in the plan of large loans advanced abroad by America so long as our present tariff policy is in force.

As an emergency measure for this or any depression, the advance of large sums of money to foreign markets would be salutary and temporarily constructive

Prohibition—its establishment and disestablishment—seems to be fated to play the rôle of a panacea in the minds of Americans. Frequently during the twenties, there appeared, as a regular part of a campaign, advertisements and news articles claiming for Prohibition credit for the period of prosperity. There was little justification for the claim, but it was an effective argument during a period when business was good and when Prohibition was being attacked on social and moral grounds.

Ironically, in this period of depression the tables have

been turned on the Prohibitionists. Since 1929, there have been many appeals for modification or repeal of the Prohibition amendment on the ground that the introduction of controlled manufacture and sale of liquor (light wines and beer particularly) would produce income for the government and provide employment for hundreds of thousands. This latest attack on Prohibition on economic grounds has a much greater basis in fact than had the economic defense of Prohibition, but is probably not as valid or all-important as is often assumed.

The case for or against Prohibition remains fundamentally a social and moral question. Some psychological benefits may accrue from the announcement that the present absurd mockery was to be a thing of the past. But unfortunately, as an economic remedial measure, Prohibition has only a widow's mite to offer

Within the scope of social questions, but of a totally different type, lies another remedial measure, the shadow of which is already being cast upon the path of the public of the United States. It seems inevitable that in the congressional session that meets in December, 1931, the question of a dole (a rose smells as sweet by any other name) will be presented for serious consideration. Its label may be different, but its content will be the same. A veterans' bonus, unemployment relief fund, or what you will, will occupy much of the time and discussion of the Senate and the House of Representatives.

A dole system is certain to have an immediate stimulating effect upon industry. It distributes purchasing power among those whose necessity for mere subsistence requires the direct exchange of funds received into bread, clothing and shelter. It takes the inactive dollars of the wealthy by taxation and distributes them among the needy.

Socially, however, the dole is a most pernicious and dangerous instrument. To the extent that the much-vaunted nobility of labor is a fiction based upon the necessity for people to labor, the removal of the necessity of working spells the conversion of workers into drones and charity patients of the state. To the extent that the receiver of a dole accepts his unemployment pittance from necessity rather than choice, he is, of course, free from any criticism of his character, and the burden of the indictment must rest upon capitalism and the state. Under these circumstances the dole becomes a palliative that may serve to prevent wholesale starvation and social revolution; and, as such, it is assuredly desirable. If there is no other alternative but starvation, the dole is socially desirable and it would be downright inhumanity to oppose it. But to seek for no other solution than the granting of charity to the unemployed is to free the state of the obligation to provide a fundamental improvement and to confront the problem frankly.

The dole can only promote compromises with basic problems, avoidance of issues, and neglect of proper correctives

During the week of October 5, 1931, there emanated from official Washington three plans of varying degrees of definiteness that are unquestionably the government's most important contributions thus far to a possible solution of the contemporary depression.

The first plan envisages the creation of a pool of $500,000,000 of bank and government funds with which to rediscount certain paper and securities not now eligible for rediscount with the Federal Reserve System.

The second contains the suggestion that the Federal Reserve System should be so modified as to include in its portfolio of eligible paper broader classifications than are now legal.

The third suggestion is a general one looking toward the formation of a bank with a capital of two and a half billions to serve as a rediscount agency for mortgage paper and to render a definite stimulus to the building of homes.

The Federal Reserve Needs Attention

Mr. Hoover's plan relating to the establishment of a bank with a capital of $500,000,000 (or more) for the purpose of rediscounting bank assets not now eligible for rediscount by the Federal Reserve System is significant and constructive for two reasons. The first is that an immediate agency is created to render substantial service to banks whose assets have become practically useless through the unprecedented shrinkage of markets and values. The second is the evidence implicit in Mr. Hoover's action that the government is ready to lend its support to the banking machinery of the country.

Mr. Hoover's suggestion of a fundamental change in the present Federal Reserve System must strike a sympathetic chord in every observer who has watched the inadequacy of our present central banking service. In itself it is a subject worthy to be considered among the permanent measures that will have to be undertaken if the system under which we live is to survive.

It is Mr. Hoover's third—and least advertised suggestion—that merits the most careful consideration and offers the most dramatic possibilities of immediate industrial and financial amelioration. On Thursday, October 7, there appeared in the press, in unimpressive type, the tentative plan of the formation of a bank of two and a half billions of dollars for the purpose of rediscounting mortgage paper and of rendering a definite stimulus to the building of homes. Within the vague outlines of that idea lies the lever by which business, credit, and public confidence may be raised out of the mire of despair in which they dwell.

Economic life stands upon a tripod. One support is gold and credit; another faith; and the third trade. In the final analysis, trade is the most important element in the adequacy and stability of the credit machine, as well as of public faith. In America there are roughly five billions of gold and ninety billions of trade.

If the ninety billions of trade are paralyzed, in whole or in substantial part, nothing relating to the five billions of gold will avail. If, on the other hand, trade is in a healthy condition, there will be no lack of public confidence and no problem of credit.

What offers the best medium for the necessary stimulus of trade? Certain positive elements must be present

Something must be done to stimulate trade. The use of credit as such, in times of depression, has not worked

in that device which is selected. Whatever stimulus is adopted must relate to an industry which uses large supplies of raw material and is in itself of such dimensions as to affect the general well-being of the country. The most obvious suggestion is the building of homes. Building is the largest industry in the United States in normal times, averaging nearly ten billions of annual expenditure. There is, unquestionably, at the present time, a deficit of residential building. The intensive activity that went on from 1923 to 1928 created an excess, but the experience of building since 1928 has been such as to absorb this surplus and leave in its place a very substantial deficit—that is, if one has a right to use the history of the United States prior to 1922 as a reasonable index of normal requirements. Building is one of the largest users of basic commodities and raw materials. A stimulus to building would serve as a stimulus to activity in collateral lines, like automobiles, roads, utilities, etc.; moreover, the increase in the number of home owners is socially desirable. And finally, homes—once built—are consumer goods and do not add to production facilities.

Home Building Encouragement

Therefore, in Mr. Hoover's third announcement—that relating to a device to encourage home building—lies the greatest promise of immediate revitalization of trade. The mere announcement, however, of a fund of two and a half billion dollars for the purposes of rediscount means little in itself. The significance of the suggestion depends on whether this money will be used to finance new factors created to stimulate the operation of the plan; and, finally, its value depends upon the control that can be imposed upon the very possible overexpansion that might result from a marked stimulus to the building program of America. A figure of two and a half billions that might be used by the government, or by some Federal agency, or some central organization, could easily grow into four billion dollars when the investment of individual home owners was included. Parallel development required by the huge building program might easily add another three or four billions to the expenditures, and would result definitely in the problem of over-stimulation and the need of some kind of brake to avoid another period of excess. The severity of this problem is not to be minimized.

There are over thirty million families in this country. A sum of even four billions of dollars (of which half was provided by the individuals themselves) would provide, at an average cost of $5,000 per home, 800,000 homes. That figure would mean a new home for less than one out of every thirty families, or every one hundred and twenty persons. Today there is an automobile for every five persons. New York, with a population of 7,500,000 would engage in a building program of about 60,000 homes—assuming that its population contributed $150,000,000 to the project. One family in thirty would build. Twenty-nine families out of thirty would be indirect beneficiaries, and the more able to hold their own homes, or pay their rent, or seek better quarters. All things considered, there seems to be no sound objection to the plan from the standpoint of the landowner or realtor.

The alternative to emergency measures may be disaster. But in social economy, just as in medicine, the most valuable contributions will be those which are permanent, and which are derived from an understanding of the causes of disaster and make for the prevention of further crises.

In everything but his scientific development man is probably not far from being completely dominated by a fatalistic philosophy. He is loath to inaugurate a process of redirection of the course of even those events which are consequences of his own acts and errors. Such fatalism is obviously unfortunate. For business, in particular, the cost may even be more drastic. If business persists in reenacting the fallacies and obsolete fashions of yesterday, we may be sure that those who are the tragic victims of those errors will sooner or later take from business the initiative and freedom of action that have meant so much to it, as well as to the economic development of the American nation.

We have in recent history had some striking manifestations of the growth of the people's and government's voice in the control of business. The Interstate Commerce Commission, the Federal Trade Commission, the State Utility Bureaus, the boards of control over financing, the mass of restrictive business legislation are all signposts of the increasing socialization of industry. The prospect of further development along this line would be satisfactory if there were any certainty or even indication that the method had proven effective.

The state, as we have it now and as it is likely to be in America, offers no panacea. The accomplishments of government in industry and trade give no evidence of the possibility of a real improvement accruing from a state which controlled all instead of a state like our own which interferes and controls only in part. One would have to be exceedingly sanguine and optimistic to find in the record of the government since 1929 or before the assurance that our economic destiny is to be more safely entrusted into the hands of politicians than into those of individual business men.

One of the fundamental causes of the dislocation of industry that caused the depression of 1929 was the unwise expansion of production. There are more than a few who suggest as a corrective the creation of a Federal Board to allocate to industry production quotas. May that day never come!

The lessons of the years since 1928 are, however, much too significant to be neglected by any of us. If government offers a poor alternative to business itself as an agency of control, then in order to avoid the inevitability of the imposition of government regulation, it is an urgent necessity for industry to take energetic remedial and regulating steps on its own initiative.

First, it is essential for business to realize that unquestioning devotion to mass production can bring disaster. The search for lower costs, distribution of overhead, and the development of large plant capacity and huge dollar volume may bring as its only result mounting expenses of distribution, reduction and nullification of profit, and periodic industrial paralysis. The photographs of Mr. Ford as patron saint of American industry must be removed from the executive offices of business along with the portraits of many others whose distinction as inventors of machines or processes is great, but whose specific inventions have become outmoded and have to be supplanted by better functioning devices. The disciples of Fordism are preaching an alluring but false doctrine for American business, and it is necessary to close our ears to their pleadings if we are to steer safely to harbor.

Business must recognize that its development has been lacking in balance; that no improvement in production technique that increases capacity and output can continue permanently or in security unless the power of consumption within the nation is quickly built up to the new level of production.

It is a matter of utmost responsibility to take every possible step to assure the contemporary development of consumption, if industry is to avoid the necessity of almost permanent restriction of growth

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A National Economic Council

The three branches of government—the executive, the legislative, and the judicial—deal in large part with the economic relationships of people. They do so equipped only with the information and judgment which is theirs by birth and training and which men are incomprehensively proud to call common or horse-sense. The legislative, judicial, and executive departments of our government are too often called upon to make decisions on matters relating to finance, international trade, and complex problems of economic relationships when they have little knowledge of the accumulated facts of the particular case and even less understanding of the principles involved in them. There is, therefore, a fundamental need for a permanent organism of economic research and opinion. There should be constituted by act of Congress a "National Economic Council," which, it is hoped, will grow to the same position in the treatment of economic problems that the United States Supreme Court has attained in the treatment of legal matters.

It would be the duty of this Council to investigate and present its findings upon those economic subjects that are important in the proper regulation of the social economy. The list of subjects that would come within the province of this Council must of necessity be dynamic, changing as the conditions of the nation's life change. If the requirements of today were the basis for the program of this Council, there would be included: (1) Tariff, (2) International War Debts, (3) Farm Relief, (4) Social Insurance, (5) Wage Reductions, (6) Sherman Anti-Trust Law, (7) Banking System, (8) Production Methods, (9) Problem of distribution, (10) Adequacy of or substitute for present money system for national and international needs.

Expert Advisors to the Council

This broad range of subjects covers a field so large that no single group of men could encompass it. Therefore, the Council would of necessity be empowered to call upon such expert advice as was necessary.

As far as possible the National Economic Council should be free of political bias. But how men can be found who will discard their basic prejudices and traditions, enthusiasms and aversions, it is impossible to know. Perhaps the necessity of dealing with problems of national and international scope will remove the blinders of narrow and provincial thinking. Perhaps the diversified character of the membership of the Council will weld out of many men of individual prejudices a unified body free from prejudice.

It is clear that industry, commerce, mining, agriculture, labor, transportation, and finance must be represented in such a body. In addition, there should be representation of the collegiate faculty ranks of economists. The members of the Council should be appointed by the President, and their term of office should be staggered so that the constitution of the body changes gradually and not at the end of a particular period of time. The tenure of office of the members should not coincide with the presidential terms. The term should be short enough so that men of outstanding industrial ability may be willing to devote their services to the Council without feeling called upon to make a total sacrifice of their private business careers. The pay should be sufficient to attract and hold men whom industry is desirous of obtaining.

The Economic Council should have no power of enforcement of its findings. Its whole power should be limited to proper research on economic problems and publication of its findings. Its power of publicity should be complete and unhampered. That would be its instrument of effectiveness.

Financing the Council's Research Work

A minimum budget appropriated by Congress should be established by the congessional act creating the body, so that its finances should not be subject to modification in each annual appropriation bill. If an amount in excess of the regular appropriation is sought, congressional and executive consent should be necessary. But in order to avoid political bias, the regular work and expenditures of the Council should be independent of either executive or congressional interference. The total expense involved would be insignificant as contrasted to the benefits that could be derived. There can be, of course, no guarantee of the complete efficacy of the Council within a year, five years, or even longer, but the odds are strongly in favor of its efficacy.

A national economic council may go very far in

enabling American business to embark upon a useful and highly essential career of planning. But in the absence of an agency that can enforce planning, there will always be a great measure of risk as to whether or not the businesses of the nation will submit to the yoke of orderly activity. No more effective business agency of control can be envisaged than the agency of credit or banking.

Nevertheless, it is the sad, all too sad truth that until now money and credit have proved themselves of little value in controlling trade and of practically no avail in lifting the world out of depression. On the contrary, as has been seen in the present gold crisis and, in fact, in the entire depression, money and credit have added overwhelming burdens to the relatively simple process of world trade.

Under these conditions, it is impossible to accept the present credit system as adequate, let alone as conducive to order in the world of economic activity. Because of the possibilities inherent in credit and because of its present dangers, it becomes the responsibility of both government and business leaders to subject it to fundamental reexamination and reconstruction.

The Bank for International Settlements

Theoretically, at least, there is no reason why the Bank for International Settlements cannot be converted into a bank of issue, adopting Schacht's plan of using this international agency as a bank of finance to make international loans for the stimulation of international trade. As a practical problem it presents difficulties, but surely no more unsurmountable ones than are to be found in any plan that will revert to credit and money as preeminently facilities of exchange or barter. The plan would grant to this bank the power to issue currency against properly accredited bills of acceptance upon basic international commodities.

Although the Federal Reserve System of the United States was introduced in 1913 and is therefore still very young, there are no valid grounds for accepting it as a perfect or even satisfactory device. It may be that its original concept was too limited, or that events subsequent to its creation have constituted so great a departure from the past as to make major modifications in the structure of the system essential.

In consumer finance, the Federal Reserve is a very insignificant factor. Generally, consumer finance paper is of longer duration than commercial and industrial loans. Whereas the latter run over a period of from sixty to ninety days, consumer paper varies from six months to two years. The individual banks, being governed by the same requirements for brief maturities of paper as the Federal Reserve System, also find consumer paper unattractive unless the borrowing company is sufficiently strong to borrow its requirements on its assets and earning power other than those inherent in instalment notes. As the amount of business involved in the use of the instalment plan totals more than five billions of dollars, the Federal Reserve, in refusing to this type of commercial paper any participation in its activities, neglects an important phase of American industry and commerce.

Moreover, the funds of the Federal Reserve System are treated as a unit. There are those who say that money cannot be compartmentalized. That may be true, but the effort has not been made. Whether or not the sums of money and credit available for business can be segregated, the fact remains that the facilities of one type of financing agency or another (other than investment bankers and security corporations) are used for four distinct types of activities, viz.:

1. Acceptances and commercial loans for seasonal needs of industry and commerce.
2. Securities for investment or speculation.
3. Real estate mortgages.
4. Consumer finance paper for the purchase of consumer goods on the deferred payment plan.

The existence of uncontrolled money and credit, the preponderance of banks that are non-members of the System, and the lack of necessity on the part of member banks—even their unwillingness—to make use of their rediscount privileges create huge leakages in the national reservoir of controlled credit

If unhampered or, if you will, unguided by precedent and rules of established banking, we were creating anew a central bank to control currency and credit, we might conceivably, in addition to granting to the bank the right of issuing currency, create a plan somewhat as follows:

Either through the sale of government bonds or Federal Reserve bonds sufficient funds would be provided to the Federal Reserve System to supply a central reserve of funds for each of the four purposes outlined above. These funds and the present funds would be used to regulate all four groups of activity.

The powers of the Federal Reserve Banks would be broadened to the extent that they would be able to purchase instalment paper and high-grade mortgages for member banks in the same manner in which they perform these operations for other types of paper at the present time. It would be necessary, of course, to exercise some sort of a control over the volume of paper purchased or rediscounted. This would be accomplished in the following manner:

Required Reports to Federal Reserve

Each bank and financial institution would be required to make a monthly report to the Federal Reserve Board, revealing the volume of each of the four types of credit advanced by it. This report would enable the Federal Reserve Board to determine the relative position of each type of financing in respect to the other types.

If, after gathering this information from the various financial institutions, the Federal Reserve Board should find, for example, that the volume of instalment paper in existence was too low in comparison to the volume of paper in the three other groups, it would attempt to stimulate the use of more instalment paper by (1) lowering its discount rate on instalment paper, and (2) purchasing large amounts of instalment paper in the open market. This would encourage banks and other financial institutions to extend more of this type of credit to consumers.

It is clear, of course, that unless the Federal Reserve System had command of all credit its power would not be complete. The existence of uncontrolled money and

credit, the preponderance of banks that are non-members of the System, and the lack of necessity on the part of member banks—even their unwillingness—to make use of their rediscount privileges create huge leakages in the reservoir of controlled credit. It would be better, of course, if the whole credit system were finally controlled by a single responsible agency. But even if the present incomplete control of money and credit by the Federal Reserve System persisted, an amplification and modernization of its powers would exert tremendous moral and practical influence upon the balancing of the forces of economic activity; certainly there would be an improvement over the present chaotic condition.

The Instalment Plan

Probably the most unorthodox element in the suggestion of a modification of the Federal Reserve System is the inclusion of consumer finance as a separate and fundamental element. The amount of discussion that has taken place concerning the instalment plan would fill a fair-sized library; the valid social conclusions of that discussion can be written on a postage stamp. There is nothing practical to be gained by participating in a squabble over the moral issues involved in the right of a man to mortgage his future for today's purchases, although it would seem that here, too, the champions of the plan have the better of the argument.

The recognition of the deferred payment plan as a regular part of the central bank's activities does represent, however, a new philosophy of credit, and this may require some further elucidation. It has already been suggested that consumer credit, as applied particularly to home building, be used as an emergency measure to raise the country from the straits of existing depressed levels. It is true that, when business is depressed, business men usually seek credit not for expansion but for protection. A fundamental distinction, however, must be made between the forms of expansion; if credit flows into production (as it did in the spring of 1930) the result is likely to be only an increase of inventories and a protraction of the depression. If consumers use credit, their purchase of goods marks a diminution of supplies on hand, and accelerates the process of the elimination of inventories.

The use of credit for consumer finance is likely to have a much more direct effect upon business than it has had when offered to production facilities

The history of the risks involved in the extension of consumer credit indicates that losses in this type of transaction are no greater than losses in commercial and industrial loans (not to mention foreign government advances). Even, however, if losses from the broadening of consumer credit were fairly large, industry that is now operating on an unsatisfactory basis could well afford to risk an amount equal to the full profit on the additional volume created by the deferred payment plan and still not injure its present status; besides, general employment would be improved. As no such losses need be contemplated, and since consumer financing can undoubtedly stimulate volume, the industrial institutions using the device must be material gainers.

The use of credit for consumer finance is likely to have a much more direct effect upon business than it has had when offered to production facilities. Individuals are less provident than business men during a period of depression, and therefore are more likely to satisfy today's desires than will the corporation that sees no end to prosperity in times of boom and no end to adversity in times of depression. Often individuals have less accumulation of capital and therefore must resort to credit, if available. Moreover, poorer consumers on the average live closer to the line of necessity than the richer business men or corporations, and the simple requirements of food and shelter enforce the use of credit for sustenance and protection. In times of prosperity, moreover, the flexibility of human needs and desires offers a demand for credit by individuals limited only by their sense of responsibility and their repayment ability. The use of consumer credit can wield a gigantic influence on the expansive powers of the consumption of any nation.

Wars—the Five-Day Week

In retrospect, it has always been possible to discover the stimulus that quickened the pulse of industry after each of the major depressions through which the United States and the world have gone. Very rarely has there been general improvement in business without some specific stimulus being at work. Ordinarily, a few or, at least, a single important development has acted as a powerful stimulus, carrying with it the acceleration of other factors closely related or even unrelated to it. Practically all post-depression developments can have assigned to them labels which indicate the novel factors that contributed the major impetus to the spreading spiral of business.

In far too many instances wars have been the stimuli that have re-energized trade. Other depressions have yielded before the popularization of a new scientific discovery. Unfortunately, in the past, sometimes decades have elapsed before the new Messiah arrived. Today we cannot afford to wait that long, we must look for immediate relief.

"The five-day week" for all American business has been mentioned many times and has received a measure of polite consideration entirely inconsistent with its merit. Who first suggested the plan or when is unimportant; the content and consequences make authorship or dates completely irrelevant.

"The five-day week" is simplified itself in content. It means just what the four-word phrase says. All labor in America would be limited to five out of the seven days of the week. The plan of working eight hours on each of five days should not be confused with a plan suggesting forty hours of work distributed over the usual six laboring days. The two ideas are fundamentally different. One is a matter of reducing the hours of production; the other suggests the creation of an additional day of leisure.

Most of the proponents of the five-day week plead its cause on the ground that it is a method of reducing factory production. They apparently hold it to be an axiom that less can be done in five days than can be accomplished in five and one-half or six days of productive activity. The result would be the employment of a larger number of people for the fulfillment of present

manufacturing schedules and consequent reduction of the unemployment produced by progressive improvement of labor-saving devices.

If an outright reduction of production were the logical conclusion or the sole justification of the five-day week, there would be, on the contrary, strong reasons indeed for questioning the practicality of the plan. The reduction of production—even with the employment of a greater number of people for the same output—would be open to the same attack that can be directed against any plan that provides for the reduction of the per capita productivity of labor. Such a reduction always means a diminution of the total wealth available for distribution among all. If, on the other hand, the history of reduction of hours in America repeats itself, we may expect that a five-day week will prompt further improvements in industrial method, thereby re-creating the old problem of technological unemployment.

The five-day week seems to be inevitable. It is sound economically; it is desirable socially. It must come sooner or later, and there is no advantage in waiting passively for its advent

It is the certainty that a five-day week will increase the production requirements or the consumption of the nation, create a scarcity of labor, and necessitate the improvement of technique but without increased technological unemployment that should recommend the plan as a constructive change in American social economy.

The five-day week seems to be inevitable. It is sound economically; it is desirable socially. It must come sooner or later, and there is no advantage in waiting passively for its advent. It is incumbent upon government, labor, and business to speed its arrival.

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Certainly—End the Depression!

ANDERS JANSSON

IN A recent editorial (*A.M.*—Vol. 75, page 906a) were advanced certain pithy suggestions for bringing us out of the depression by Easter. Just as it points out, we must face the facts, write off the difference between what we'd *like* to get and what we *can* get, and the job is done. Simple, efficacious, but not perfect; yet obviously the lesser of those evils facing us.

I wonder if by any chance Government could help the good cause along by releasing an allegorical handbrake from the wheels of Industry? Men and machines stand ready; obsolescence has claimed the equipment of the manufacturer and the worker alike, and if we can get the machine over dead center—well, things will boom, that's all!

Coming back to Government: What, for instance, would be the effect of an immediate recognition of a new nation—Russia? For Russia *is* a new nation, a friendly nation as far as American machinery and equipment is concerned. True, Russia's code of ethics and morals is, superficially at least, a little at variance with our own, but the producer of machines is not concerned with these things.

What he wants is payment for his goods—a matter of credits. The effect of Government recognition is a matter of conjecture; it is not a matter of conjecture to say that those European nations that are establishing friendly relations with the Soviet Union will have a long jump on their American competitors when diplomatic relations have been established, as they eventually will be. So, why defer the inevitable?

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Built-In Verniers

WILLIAM S. ROWELL

WHAT maker of machine tools, especially precision lathes, will first supply a vernier that will make it possible to set the compound, or other graduated circle, to a fraction of a degree? This is a crying need. If the graduated 2-in. circle of a toolmaker's vernier-protractor can be set to read to five minutes of arc, the 6-in. circle of the base of a compound slide should be just as readily read to two minutes of arc, when provided with a suitable vernier.

Shop drawings are often dimensioned in degrees, minutes, and seconds. Such refinement, as measurement to seconds of arc, is seldom necessary, and cannot be secured by ordinary appliances. The lathe man, recognizing its absurdity, makes a stab at it, and usually gets by. How much better it would be to provide him with a vernier that would enable him closely to approximate the required dimension.

■

Industrial National Defense

C. B. COLE
President, Tool Equipment Sales Company

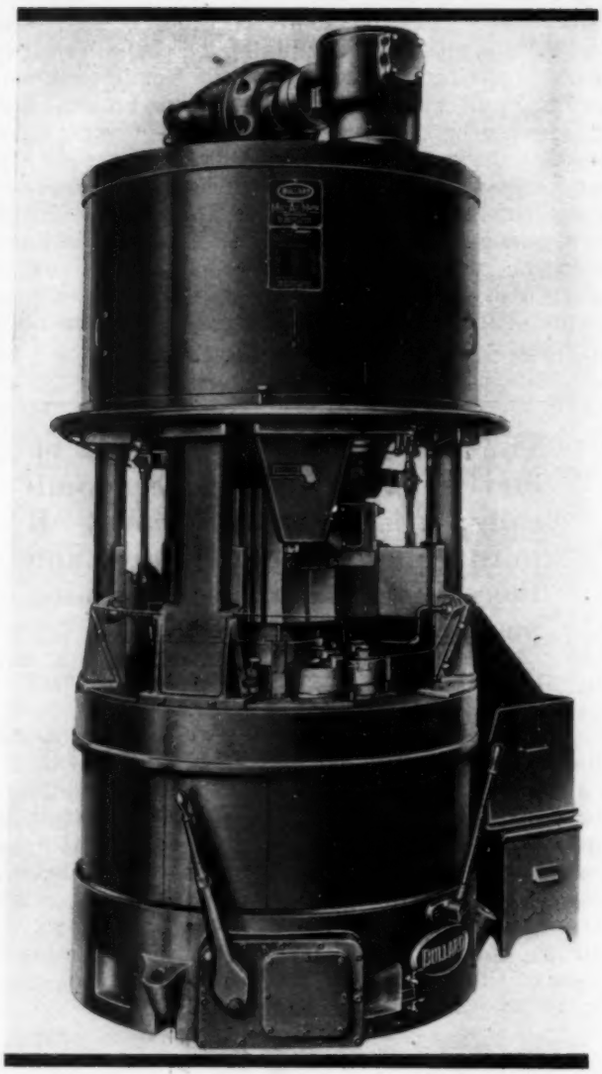
DESPITE all peace pacts and pacifist organizations, we are probably going to have war until human nature changes considerably. Only when this occurs will it be possible to ignore the problem of defending our rights from aggression.

Mechanization of warfare has increased tremendously since the Great War. This has made the metal-working industry a most important factor, all other industries, commerce and transportation being dependent upon it for the necessary machinery, machine tools and equipment to produce their various items.

Since civilization as we know it would collapse without mechanical equipment, it is of primary importance that the Congress assist in its protection by passing the bill providing for educational orders. By doing so, it will enable the War Department to determine accurately the amount of material that can be obtained from metal-working plants in time of national emergency. This information is invaluable, as it will be found to be the yard stick for measuring definitely such additional requirements as may be necessary. Only through educational orders, can the metal-working industry acquire the experience and the necessary equipment.

SHOP EQUIPMENT NEWS

Bullard Types C and D Mult-Au-Matic Chucking Machines and Type D Center Lathe



Type C Mult-Au-Matic, which is built with six or eight spindles

Analysis of present manufacturing methods with their relation to the higher speeds and feeds to be employed with the cemented carbides, has caused The Bullard Co., Bridgeport, Conn., to completely redesign its Mult-Au-Matic Type D multiple-spindle chucking machine and the Type D center lathe. In addition, the company is also offering the Type C Mult-Au-Matic chucking machine for work of smaller size.

From the ground up, the type D Mult-Au-Matic chucking machine and the center lathe have been designed for much greater rigidity, high speeds, greater output, and more convenient operation. Each machine may be obtained with either six or eight spindles, the latter being made possible by the higher rate of operation of these machines.

The cylindrical base is massively built, and the cross-sectional areas of the side walls and the ribs for the column have been materially increased. The column is securely fastened to the base, and on its lower portion it has a long, adequately lubricated taper carrier bearing, while below this is the lower ball race of a ball thrust bearing. On the upper part of the column are mounted the tool carrying heads, which are of improved massive design and construction. Their respective feed mechanisms are mounted on a heavy casting secured to the top of the column above the tool carrying heads. This method of construction results in complete coordination of the three major working elements, spindles, feed mechanisms, and tool heads. Redesign of the carrier has resulted in additional strength, and affords a single-piece casting, providing solid support for the work-spindles. This carrier has a mating taper bearing for the column bearing and also carries the upper ball race of the vertical, adjustable ball-thrust bearing. The ball bearing takes the vertical thrust, and in addition gives a firm support for the entire weight of the carrier. It also increases the ease of rotation of the carrier when indexing.

The work spindles, either six or eight in number, are of heat-treated steel, each mounted in a pair of preloaded roller bearings. Each spindle is driven by a gear having capacity to transmit greater torque than the work capacity of the machine, and thus permits application of driving power appreciably in excess of cutting requirements. An individual spindle brake mechanism operates during indexing to bring all spindles to a stop, thereby insuring rapid, quiet reengagement of the gears. These gears have a specially rounded tooth form to facilitate quiet meshing. The spindles are designed to accommodate chucks or fixtures for manual operation. They are also applicable to power-operated chucking if desired.

The feed mechanisms differ from those previously used in several respects, the most noteworthy of which is the replacement throughout of the bronze bearings with anti-friction bearings. In addition, the construction has been materially strengthened. The tool heads have also been made more massive, and the slides upon which they operate have also been redesigned with this point in view. A system of automatic slide lubrication has been included as a part of the regular lubricating system. Sufficient distance from the face of the tool slides to the center of the spindles

has been allowed for heavier tool blocks.

Because of the heavier loads to be encountered and the higher speeds, it has been deemed necessary to provide a positive means of lubricating all moving parts with clean lubricant. Therefore, a continuously driven gear pump delivers oil from the reservoir to the filters, and it is then passed through the drive bracket and distributed to the feed works, thence to the tool heads, and all other moving parts. An individual line delivers filtered lubricant directly to the precision spindle bearings. The cutting compound system is an integral part of the machine. A system of chip and water guards is supplied.

As mentioned previously, the Type C Mult-Au-Matic is an entirely new offering by the company and is intended for smaller work than the Type D. It is built in six or eight spindle models, and incorporates the features of construction mentioned for the type D. Five or seven stations are provided for the machining processes. At the work stations there may be mounted a variety of boring, drilling, and reaming tools in conjunction with a variety of facing and turning tools. These tools are set to meet the work conditions for each operation, and from the feed mechanism receive their proper feeds. Spindle speeds are set individually at each station through a combined system of cam and change gears.

Specifications

Type "D" Mult-Au-Matic

Details	8-In. 6-Spindle	8-In. 8-Spindle	12-In. 6-Spindle	12-In. 8-Spindle	16-In. 6-Spindle	16-In. 8-Spindle
Chuck capacity	10 in. in diameter 10½ in. in height		12 in. in diameter 10 in. in height		18 in. in diameter 9¼ in. in height	
Spindle speeds	11 changes from 33 to 300 r.p.m.		11 changes from 27 to 241 r.p.m.		11 changes from 20.2 to 182 r.p.m.	
Motor drive	20 hp.	25 hp.	25 hp.	30 hp.	30 hp.	37½ hp.
Floor space (diameter)	78½ in.	87½ in.	78½ in.	87½ in.	87½ in.	98 in.
Height	136¾ in. from floor, not including motor.					

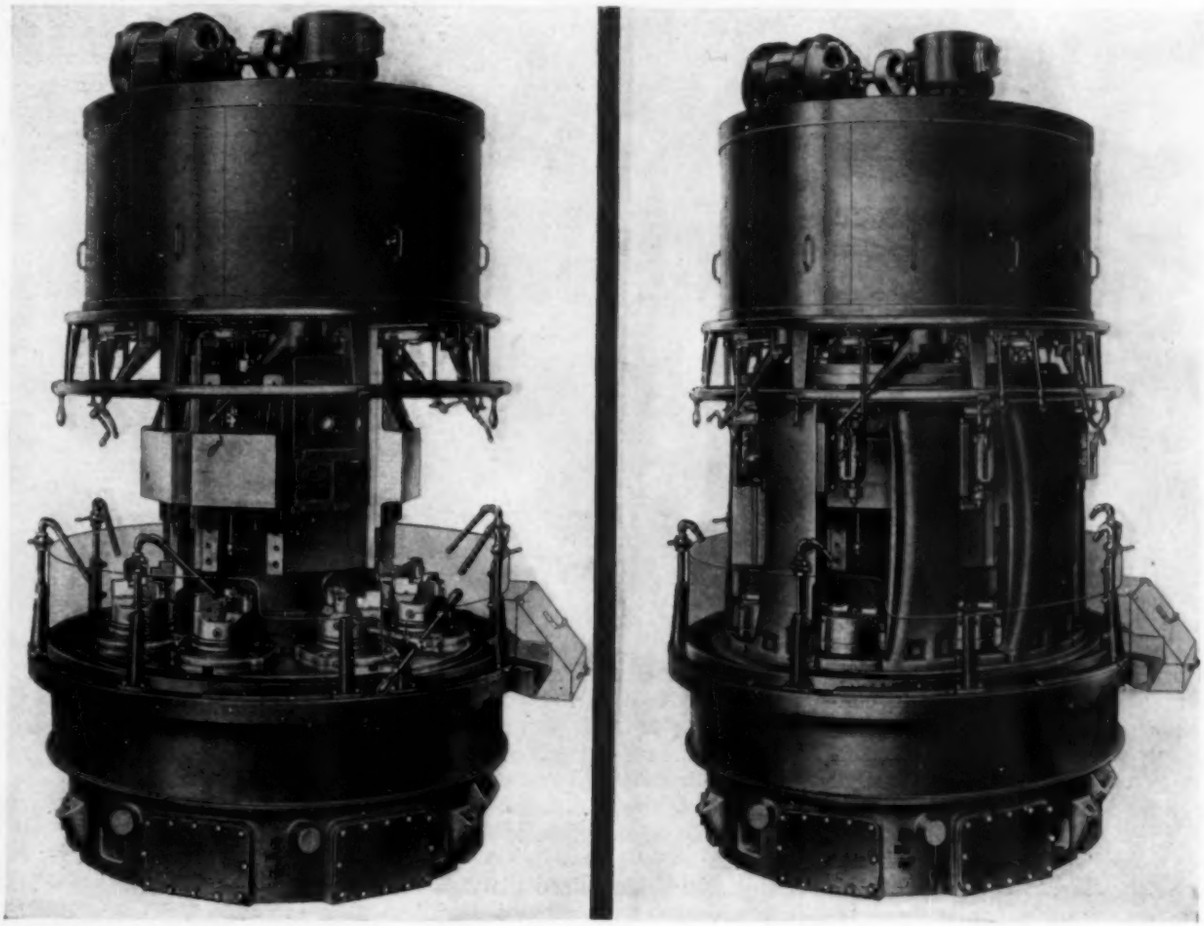
Type "D" Center Lathe

Details	6-Spindle	8-Spindle
Capacity	4-in.; 16-in. between centers	
Spindle speeds	11 changes from 46.8 to 421 r.p.m.	
Motor drive	25 hp.	30 hp.
Floor space (diameter)	78½ in.	87½ in.
Height	136¼ in. from floor, not including motor	

Type "C" Mult-Au-Matic

Details	6-Spindle	8-Spindle
Capacity	6½ in. in diameter; 6 in. high	
Spindle speeds	Within multiples of nine, from a minimum of 17 to a maximum of 707 r.p.m.	
Motor drive	20 hp.	25 hp.
Floor space (diameter)	55½ in.	65½ in.
Height from floor	121⅛ in.	130¾ in.

Through the combination of main head and tool column heads at each of the work stations, it is possible to approach the smaller work, for which this machine is designed, from different directions for concentrated operations at close quarters and still maintain in the inoperative position sufficient room for easy tool setting. Tools such as core drills, reamers, and boring bars are mounted directly on the main column, which provides a uniform feed at all work stations.



Left—Type D eight spindle Mult-Au-Matic

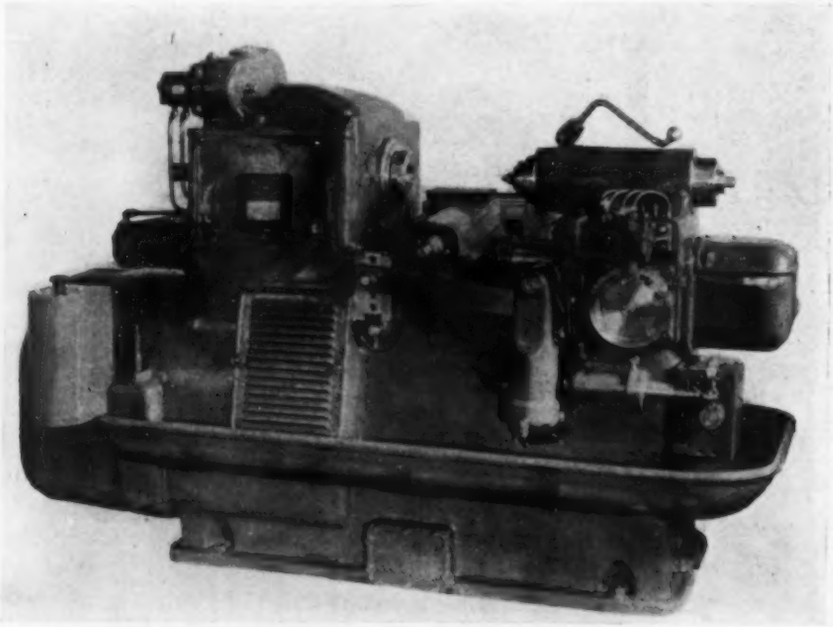
Right—Type D eight-spindle center lathe

Tool carrying slides are mounted on heavy tool columns secured to the upper and lower sections of the machine on their outer diameters. As the Type C is primarily designed for fast work, it is necessary to facilitate chucking within the period allotted for machining operations. Therefore mechanical power-operated chucks are included.

Barnes No 8 Automatic Lathe

Multi-range hydraulic feed, multiple V-belt drive direct from the motor to the main spindle and a variable-speed motor drive controlled automatically through the hydraulic circuit without the use of a clutch are the outstanding features of the No. 8 automatic lathe made by the John S. Barnes Corp. of Rockford, Ill. to supplement the No. 17 and No. 12 lathes already on the market. The headstock, tailstock, bed, motor compartment, chip pan, coolant reservoir and base are all in a single rigid casting, assuring alignment of all moving parts.

In order to provide safe operation



at the higher surface speeds made possible with the new cemented-carbide tools, the spindle is mounted in anti-friction bearings. Contrary to conventional practice, the spindle rotates clockwise and the front and rear tool carriages are designed to put the full load on the lathe bed. From the main spindle are driven the two variable-delivery feed pumps, designed and built by the Barnes company. With this arrangement no valves are required in the feed circuit proper and the feed per revolution of the spindle is maintained with variations in spindle speed. A separate Barnes gear pump supplies the rapid traverse circuit and is driven by an individual motor.

With the Barnes hydraulic feed, the slides are brought against positive stops, maintaining a high degree of accuracy throughout the life of the lathe. Both front and rear carriages are automatically rapid traversed to the work, fed in, and returned. The front carriage is first fed forward to bring the tool in to the correct depth and then is traversed longitudinally, dropping back to relieve the tools on the return stroke. As in former Barnes lathes, the front tool slide is actuated by a bar that is swung into position through a hydraulic plunger. By varying the adjustment of the fixed end of this bar it is possible to cut tapers. The rear carriage is fed independently of the front through a separate hydraulic circuit. Individual feed dials on the pumps regulate the rate of feed for each carriage. Set-up, owing to the new automatic hydro-electric control, is much faster, and the machine can be quickly changed over from one job to another.

Cast integral with the main bed casting is the tailstock in which is mounted a quill carrying the live center. The center itself is mounted within the quill on anti-friction bearings spaced on wide centers to take care of the loads overhung on the point of the center. The quill itself is quickly adjusted and clamped by a single lever.

Reeves Inclosed Vertical Transmission

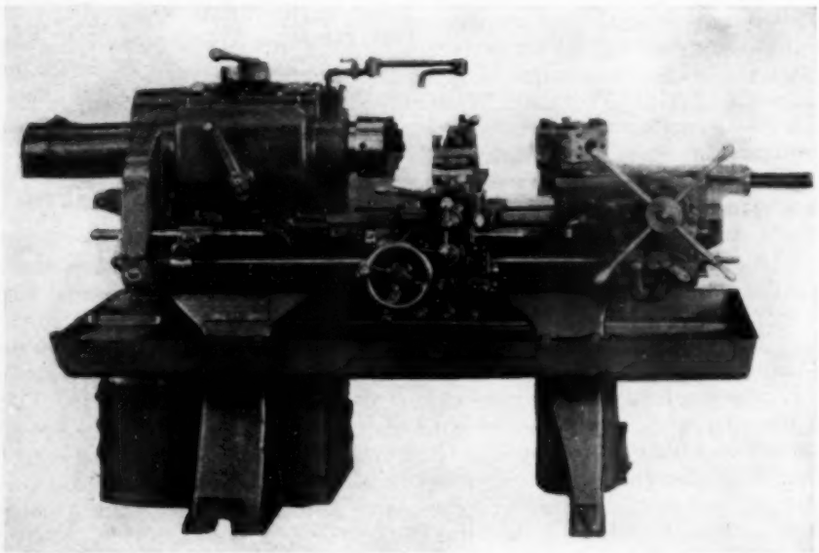
For installations requiring an inclosed variable-speed drive of small floor space, the Reeves Pulley Co., Columbus, Indiana, is introducing a vertical inclosed transmission which incorporates the standard internal operating parts of the Reeves variable speed drive. The side of the housing may be removed by means of four capscrews, and the lid may also be removed for inspection of the internal operating parts or minor adjustments. U-shaped recesses in the other section of the case permit removal of the entire operating parts.

A feature of the vertical inclosed design is the convenience in lubrication facilities. All shaft and thrust

bearings are lubricated through force-feed fittings located in two convenient exterior panels. Shafts, driving keys and disk hubs are lubricated by means of force-feed fittings in each end of the shaft extensions.

This transmission may be equipped with electric remote, electric automatic, and mechanical automatic controls, and with motors, motor bases and other accessories for varying requirements of speed control. The motor rails are so mounted that the lid of the cover section is entirely accessible for removal. Cross rails, on which the motor is mounted, are also slotted for adjustment, and accommodate any design or type of motor of the proper horsepower requirements. The motor base is adjusted vertically in order that any stretch in chain or multiple V-belt drive may be taken up. For extreme reduction in speeds an auxiliary countershaft may also be installed. Motor rails and motor may be mounted either in connection with the pivoting motor base, or on the side of the transmission. This transmission is available in ten sizes covering speed ratios of from 2:1 to 8:1 inclusive.

Warner & Swasey No. 3 Universal Turret Lathe



Bar capacity of 1½ in. and maximum swing of 15⅜ in. are embodied in the No. 3 universal turret lathe announced by the Warner & Swasey Co., 5701 Carnegie Ave., Cleveland, Ohio. Six spindle speeds from 67 to 740 r.p.m. are obtained by conveniently located levers with forward and reverse provided for all speeds. Chrome-nickel, heat-treated gears are used throughout. The entire head runs in a bath of oil. Head clutches are designed for high torque at low speed, and are easily and quickly adjusted. The spindle is mounted on double Timken roller bearings, both front and rear. The head-end gear train, which carries the feed from the spindle to the feed shaft, runs in a fully inclosed box and is splash lubricated.

The hexagon turret is mounted on a Timken roller bearing. An adjusting nut is provided for the adjustment of the turret for proper freedom of movement, but does not interfere with the permanent alignment of the turret with the spindle. Automatic indexing, with an automatic turret binding mechanism, increases the convenience of operating the turret. Backward movement of the slide automatically releases the turret clamp and indexes the turret, while a forward movement of the slide automatically clamps the turret in position. A hardened bearing surface under the turret slide lessens the wear at this point. Six power feeds are provided for the turret.

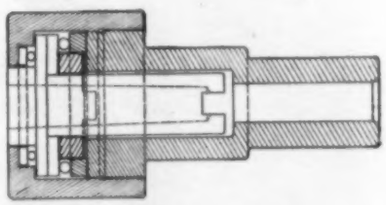
The square turret cross-slide has an extremely long dovetail bearing surface, which is made so that it is not exposed to grit and chips in any working position. A plunger pump provides lubrication to all slide bearing surfaces, as well as to the ways under the carriage and the feed pinion bearing. All moving surfaces receive their lubrication from this one central point. The universal carriage is equipped with a quick indexing square turret, and is provided with six power cross and longitudinal feeds, both forward and reverse.

Levers on both aprons are conveniently located, and the power feed is easily engaged and disengaged by a slight pressure. An automatic feed throwout disengages the longitudinal power feed at the end of the cut. The cross-slide carriage stop roll has six stop screws which make possible the cutting of more than one diameter with one tool in the square turret.

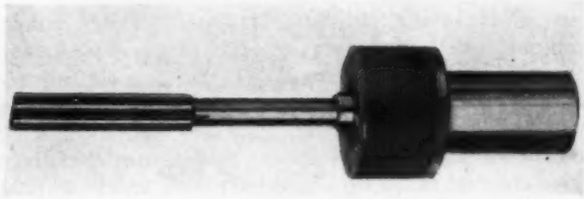
The ribbed bed casting is of semi-steel. A cabinet-leg motor drive is standard. For light duty, a 3-hp. motor is recommended, and for heavy duty a 5-hp. motor is supplied.

Scully-Jones Short-Nose Floating Reamer and Tap Holder

A short-nose floating holder for reamers and taps is being offered by Scully-Jones & Co., 1901 S. Rockwell St., Chicago. Like the standard Scully-Jones holders it can be used with automatic screw machines and turret lathes, but it is particularly designed for multiple head reaming and tapping machines where the space is limited axially. Compared with the standard holder the collet is withdrawn within the tool body, and the



Two ball thrust washers are used to support the floating collet in the Scully-Jones Reamer and Tap Holder



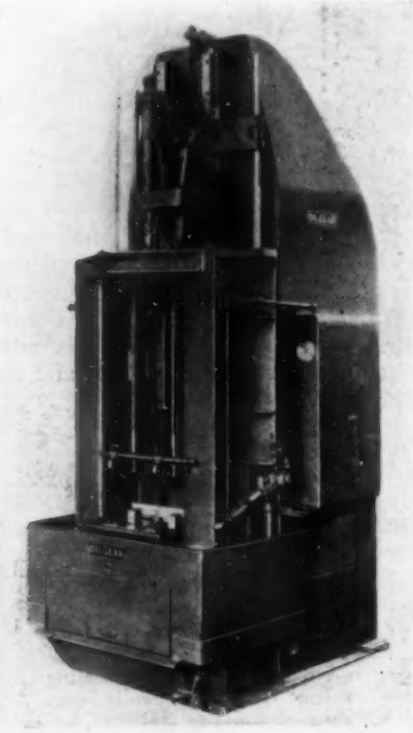
Scully-Jones Short-Nose Floating Reamer and Tap Holder

overhang is reduced as well as the overall length. This construction may be seen in the cross-sectional view, in which a taper socket collet is illustrated.

The shoulder of the collet floats between two sets of ball thrust carriers, the smaller of the two carrying the weight of the tools when the holder is mounted in a vertical position; the larger, the work reaction. Side float is limited by the clearance between the hole in the outer adjusting nut and the outside diameter of the collet, and is usually 0.015 in. This permits parallel alignment when the hole being tapped or reamed is off center with the machine spindle.

"Cyclematic" Vertical Broaching Machine

Centralizing work by hand is entirely eliminated on the vertical "Cyclematic" broaching machine announced by The Oilgear Co., 1301-1417 W. Bruce St., Milwaukee, Wis. The work lies flat on the table, which is placed at a convenient working level of 30 in. from the floor. The operator lays the work flat on the table and treads on the starting pedal. From this point on, the entire broaching cycle is automatic. No broach handling is required, and the time of threading work over broach shanks is eliminated.



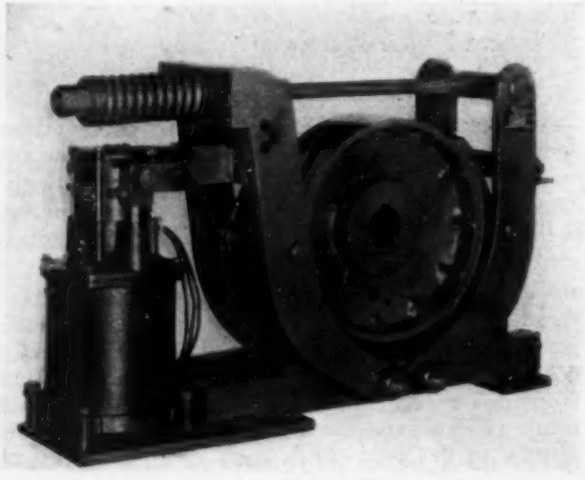
As the starting pedal is depressed, the broaches descend and engage in mechanically locking sockets. The descending broaches accurately centralize the work. Automatically the table rises, drawing the work over the stationary broaches. At the top of the stroke the upper locking sockets disengage the broaches and the table travels on so the work clears the shanks. It should be noted, however, that the broaches are secured at both ends during the critical part of the cut. The ejector bar moves forward to remove the work from the fixtures. It is possible to arrange the ejector so that the work clears the table to fall onto a chute or conveyor. The table then descends to the loading position automatically under controlled rapid travel, and the upper broach sockets descend to engage the broaches and lift them to the starting position. The teeth of the broach begin cutting from the top of the work. As the work passes upward, the void between each two broach teeth fills with the cutting lubricant flooding the upper surface of the work. The incoming chips then create a pressure within this confined lubricant and force it about the cutting edges. All steps of the cycle are positively interlocked so that each must be completed or the machine stops automatically. Safety valves, which can be set for any maximum broaching pull, are provided. Also on the right-hand side of the machine and directly in line with the work zone and at elbow height, there is the master safety lever, which can be used to stop the cycle immediately at any point. It can also be used to reverse the action at normal or reduced speed for clearing trouble.

The Cyclematic vertical broaching machine is made in three sizes. The Type XM-12 has a normal capacity of 12,000 lb., a peak capacity of 15,000 lb., a maximum stroke of 42 in., and a cutting speed of 34 ft. per min. The Type XM-26 has a normal capacity of 26,000 lb., a peak capacity of 33,000 lb., a stroke of 48 in., and a cutting speed of 18 to 32 ft. per min. The third machine, the Type XM-44, has a normal capacity of 44,000 lb., a peak capacity of 55,000 lb., a maximum stroke of 54 in., and a cutting speed of 29 ft. per min.

General Electric Shoe-Type Thrustor Brakes

A line of Type CR 9516 shoe-type, water-proof Thrustor-operated brakes is being offered by the General Electric Co., Schenectady, N. Y., for a.c. motors on mill, crane, hoist and similar applications where severe service requirements must be met. These brakes provide quick, cushion-like braking in either direction of rotation with either light or heavy loads, and are adjustable for braking torque over a wide range.

The characteristics of the Thrustor make it adapted as an operating



medium for these brakes. It operates well within the time required to release and set a brake satisfactorily. In a fraction of the time required for the Thrustor to move through its complete stroke, the motor comes up to full speed and the speed of thrust remains constant during the remainder of the stroke. Uniform speed characteristic also results in a smooth cushion-like setting when the brake is de-energized. The use of the Thrustor minimizes braking mechanism inertia, shock and noise.

On many crane applications, jogging within a fraction of an inch of hook travel is required. With a Thrustor brake, the motor armature may be rotated when jogged as little as one twentieth of a revolution.

In many installations such as on the bridge and trolley motions of a crane where the load is of such nature that a large amount of energy must be expended, it is not desirable to have the brake set immediately after power has been removed from the motor. Time delay for setting between 1 and 20 sec., or more if necessary, can be furnished by a small valve.

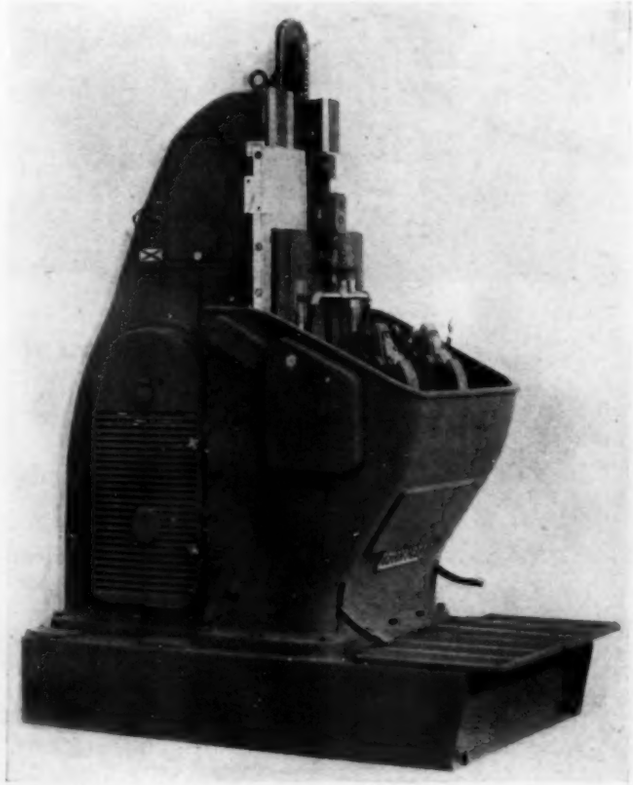
Foote-Burt Nos. 1 and 3 Duplex Surface Broaching Machines

For roughing or finishing one or more flat or irregular surfaces in one operation, the Foote-Burt Co., Cleveland, Ohio, has announced the Nos. 1 and 3 surface broaching machines. The broach employed is made in sections and is held in a holder on the slide. The design of the broach makes it possible to have rough, semi-finish and finish cuts all handled by one tool with each tooth performing its own particular function only. Due to the great number of teeth on the broach, an individual tooth is never burdened and dulled with heavy cuts. Thus, as many as 50,000 pieces have been machined on some jobs for each grind.

Broaches are usually built up in sections. For example, a broach 30 in. long would be composed of five sections, each section being 6 in. long. After many grinds the lower section, or roughing teeth, only is discarded and the remaining sections moved down. A new section is put in at the top as a finisher. This construction saves broach cost.

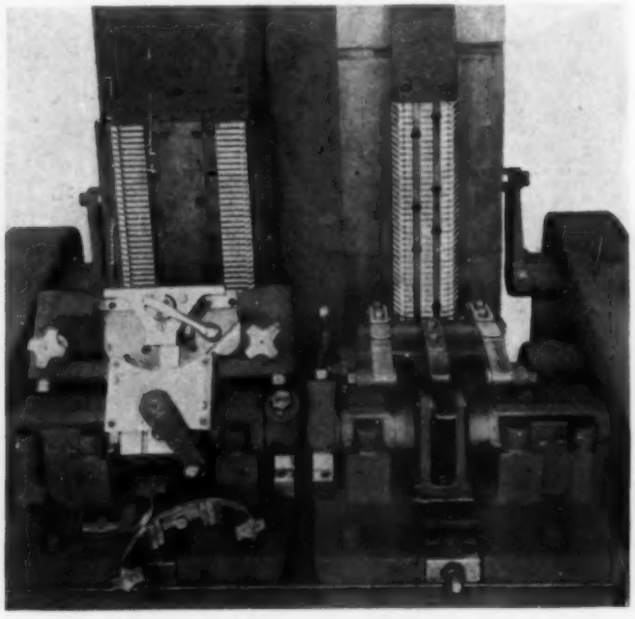
The No. 1 broaching machine has a power output of 5 to 7½ hp., and the No. 3 an input of 15 to 20 hp. The No. 1 is capable of removing 3.3 cu.in. of mild steel per min., and the No. 3 will remove 8.6 cu.in. per min. Both machines have two broach slides, which counterbalance each other since they are joined together with a spiral driving pinion and have a rack on each slide. When one slide is driving down during cutting, the other is automtaically going up.

The frame is standard on all machines and consists of a base and column with two ways. The base forms a large coolant tank, and the front platform may be raised for easy removal of chips. Fixtures are located on the front of each slide, and move to and from the broaches automatically. In some cases, they are furnished with hand operated clamps, but in other cases they clamp the work automatically. When the slide is at the bottom of the stroke, the fixture is in the loading position, and the piece to be machined is loaded while the slide moves up. As soon as the piece is in place, a foot lever



Left—Foote-Burt No. 3 Duplex Surface Broaching Machine set up for an automotive connecting rod

Below—Tooling for an automotive balancer part. The right-hand broach machines the center section. The piece is moved to the left for broaching two contact faces and two outer edges



is tripped. When the slide reaches the top of the stroke, the fixture is automatically moved into position for the work to be machined. The slide moves down and the piece is broached, the fixture being automatically moved back for unloading and reloading. If the foot lever is not tripped before the slide reaches the top of the stroke, the fixture remains in the loading position until the next cycle. The motor is designed for frequent reversing, and dogs on the left-hand slide operate a switch governing the reversing of the motor. Power is transmitted through a V-belt drive and a worm and worm wheel to the driving pinion.

Norton Type 40 Lapping Machine

A Type 40 machine for lapping simultaneously the pins and bearings of automotive crankshafts has been offered by the Norton Co., Worcester, Mass. The shaft to be lapped is rotated between a live headstock and a floating foodstock center. The lapping arms, one of which is required for each pin and bearing, are equipped with telescoping reels, each of which carries a roll of abrasive paper. Each time a lapping arm is removed from a pin or bearing, these reels are indexed automatically, thus presenting a fresh, unused abrasive surface to the next pin and bearing lapped.

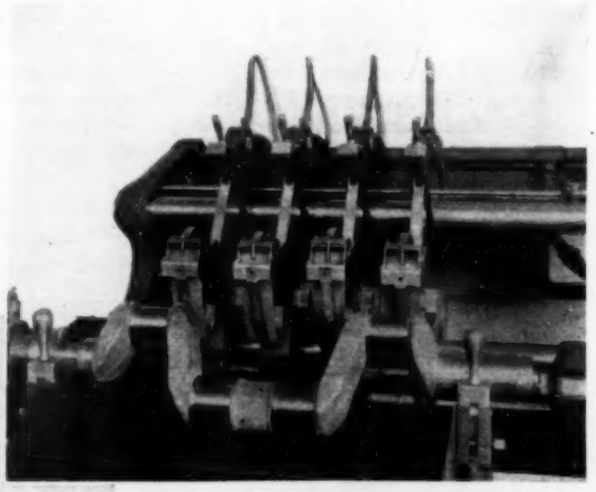
By means of a reciprocating mechanism in the headstock, the shaft is caused to move back and forth in the direction of its axis. This improves the finish and eliminates grinding wheel marks. Lubricant is pumped to each arm by a pump, which, with its driving motor, is a complete unit supplied as part of the machine equipment.

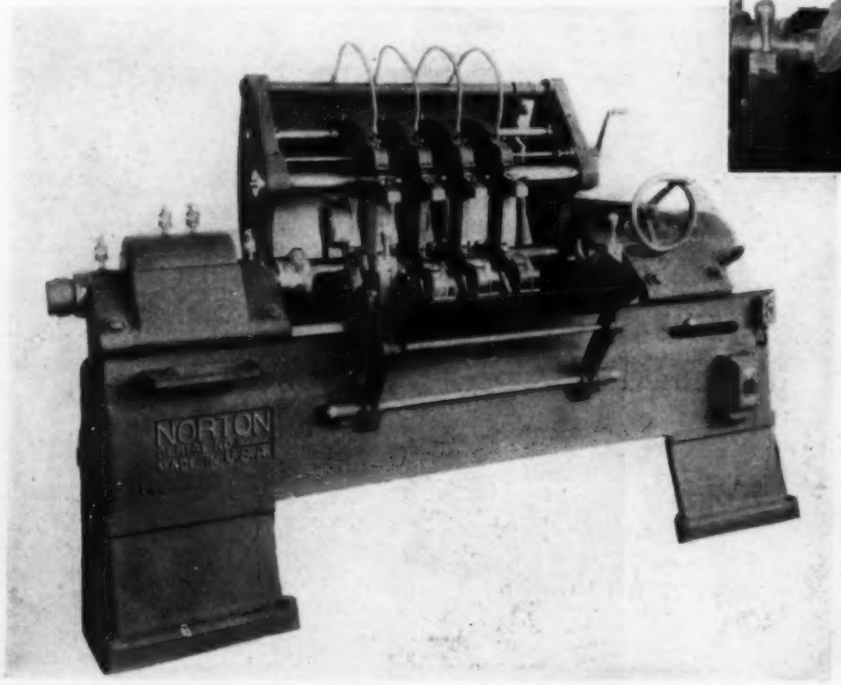
The bed of the machine is a heavy, rigid box section and upon it are mounted the headstock, foodstock and the housing which supports the lapping arms. The footstock is adjustable to accommodate a range of crankshaft lengths. The footstock center is operated by a treadle, thus permitting an operator the use of both hands when loading or unloading. A work-loading fixture can be supplied on the front of the bed as additional equipment. This fixture is of value when lapping heavy shafts.

A feature of the machine is the supporting housing for the lapping arms. Upon completion of the lapping operation, each arm is released and the housing swung backward by a spin of the hand wheel. Thus the lapping arms and their supporting members are moved out of the way for loading and unloading.

The machine will swing 16 in. over the table and will accommodate a maximum length of 48 in. Crankshaft pins and bearings up to 2½ in. in diameter by 4½ in. long can be lapped. The weight of the machine is 4,800 lb. and the floor space required is 56 x 104 in. Motor-driven or belt-driven models of this machine are available. A separate motor-driven pump circulates coolant. It is mounted at the rear.

Close-up of the lapping arms, which are equipped with indexing reels of abrasive paper to present new abrasive surface to the pins and bearings of succeeding crankshafts



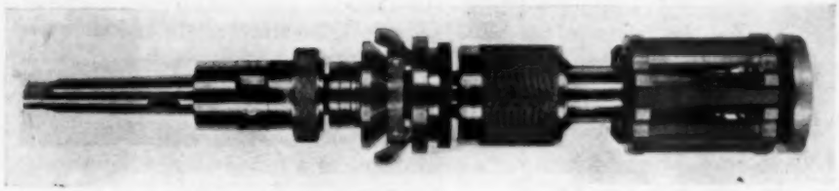


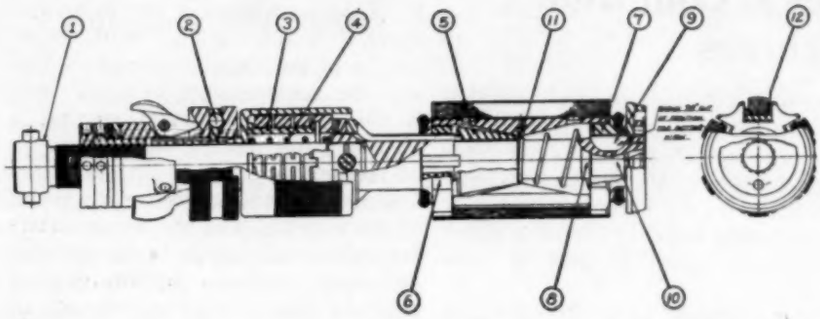
Micromatic Model 1A-O-F Three-Finger Automatic Hone

Twelve improvements are found in the Model 1A-O-F three-finger automatic hone announced by the Micromatic Hone Corp., Detroit, Mich. These features, shown on the accompanying drawing, are as follows:

1. Drive ball solid on drive shaft to increase strength and eliminate one replacement part.

2. Improved adjustment, with all wearing surfaces carburized, hardened, and ground.





3. The cage spring assembly has pressure regulated to suit customer's requirements.

4. Added recoil spring prevents lost motion between the fingers and the collar.

5. The cone has an angle and travel equal to 0.484 expansion of the hone, or approximately $\frac{7}{16}$ in. total stone wear, in addition to collapsing movement.

6. Width of bearing on flanges and body increased to permit better fit and easier assembly.

7. Width of bearing on flanges and body increased to permit better fit and easier assembly.

8. Larger shoulder for flange.

9. Woodruff key insures better alignment and interchangeability.

10. Elimination of tapped hole gives greater strength to body.

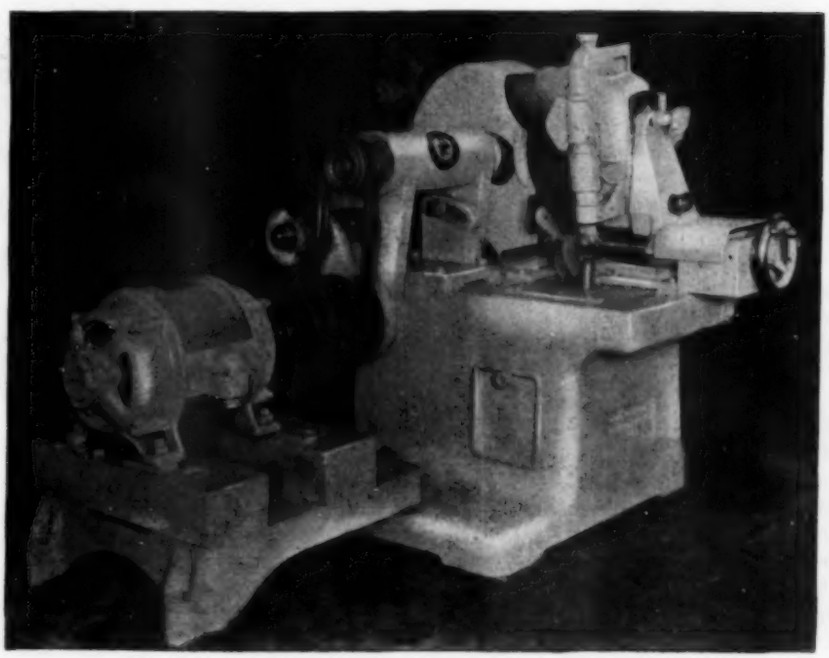
11. Hardened contact point inserted in stone holder.

12. Shell of soft steel folded over adds 40 per cent to the stone wear. This feature also prevents the hardened edges of the stone holder from coming in contact with and scoring the cylinder wall.

"Production" No. 101 Centerless Feed Polishing Machines

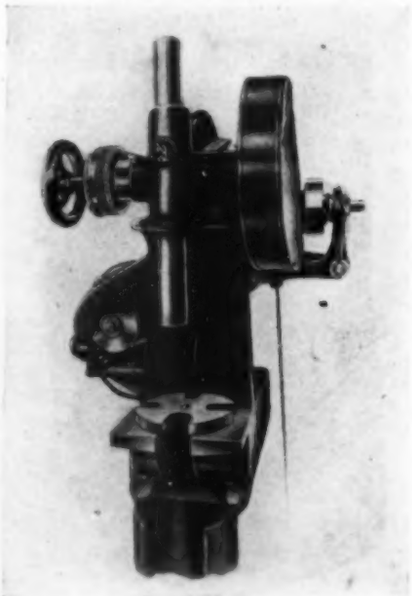
For production polishing and buffing on work up to 6 in. in diameter, the Production Machine Co., Greenfield, Mass., has developed a centerless-feed polishing machine known as No. 101. By means of the belt feeding device for the feeding member, skilled polishing labor can be done away with. Taper roller bearings are used for all shafts and forced-feed lubrication is employed. Drive from the motor to the wheel spindle is through a Dodge Triple "V" belt drive. Provision is made for quick set-ups, and complete protection is afforded the operator through hoods and guards.

The specifications are as follows: floor space for direct motor drive, 47x56 in.; height over-all, 45 in.; weight, motor drive, 1,400 lb.; wheel spindle, $1\frac{3}{4}$ in. in diameter; machine adjustable for wheels 10 to 16 in. in diameter, with 4 in. face and $1\frac{3}{4}$ in. hole; motor $7\frac{1}{2}$ to 10 hp.



Greenerd No. 50 Motor-Driven Arbor Press

A No. 50 arbor press of 3-ton capacity has been placed on the market by the Greenerd Arbor Press Co., 41 Crown St., Nashua, N. H. This press was especially developed for rapid continuous assembling, broaching, stamping, and die work, as well as for general utility operations. It is equipped with anti-friction bearings, semi-steel castings, and alloy heat-treated pinions. A $\frac{1}{2}$-hp. motor drives through reduction gearing to



the ram, which is controlled by a friction clutch and has optional hand or foot controls.

The ram travels 11¼ in. in ten seconds, and the stroke is adjustable from ½ to 11¼ in. Work up to 12 in. in diameter can be taken in the machine, and the height over the plate is 11¼ in. The press can be mounted on a bench or equipped with a stand.

Kane & Roach Series L Cold-Roll Forming Machines

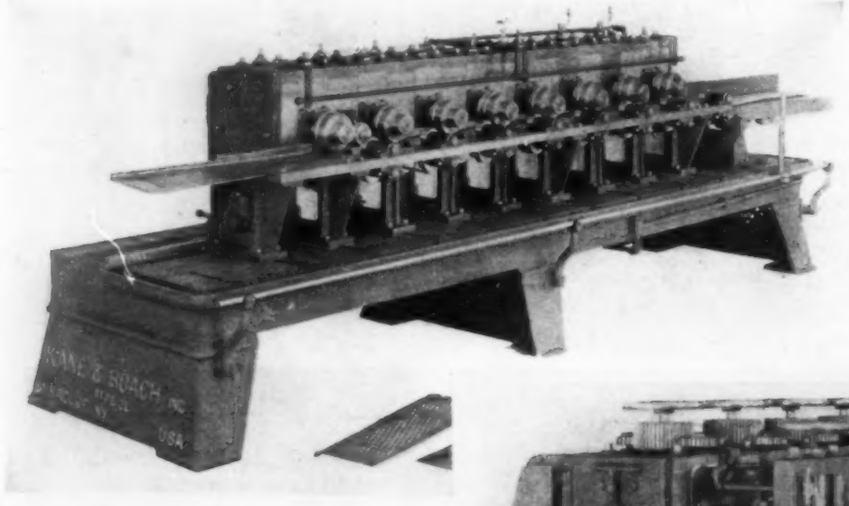
In recognition of the fact that for each type of section to be rolled and each class of shop using cold roll forming machines, there is a size and type of machine best adapted to the work, Kane & Roach, Inc., Syracuse, N. Y., have brought out a complete line of cold-roll forming machines known as the "Series L." The basic design of these machines is such as to permit maximum adaptability in making individual changes as are needed for a specific job or class of work. For example, the machine shown in Fig. 1 was shipped to the U.S.S.R. for hemming running boards for the Ford Model A automobile being built in that country. This is a single-purpose unit, hence no elaborate gearing was required. Drive was furnished by a silent chain from a motor to a clutch idling sprocket mounted on an extended worm shaft. The housings are arranged in double-stand units, each unit consisting of two upper and two lower shafts, the two lower shafts being driven by spur gears from an intermediate shaft, on which is mounted a bronze worm gear. The worm in this drive is mounted in roller bearings retained in the main frame. The top roll shafts are driven by means of spur gears meshing directly with those on the bottom roll shafts. A removable hand crank with automotive-type spiral kickout is also used.

This machine is equipped with roller bearings throughout and all gears are enclosed in oil-tight cases and operate in an oil bath. The top bearings are adjusted by means of lift screws. The tank for the coolant system is mounted on the back of the bed plate, and the coolant is pumped to a line over the rolls.

The machine illustrated in Fig. 2 is available in a range of sizes, and is of the same basic design as that in Fig. 1. This machine was put to an entirely different class of work, however, and the details were altered to suit the requirements of the buyer. In this machine "square" gearing is employed to cover the range of depth of sections required. The outboard housings are adjustable for the width of the sections, and the upper shafts are quickly adjustable by handwheels and spur gearing. Square gearing provides for a large adjustment of the vertical center distance of the rolls without losing the practical working mesh of the gear teeth. Therefore, the shallow shapes can be formed on rolls of small diameter in an economical manner, and large diameter rolls can be used to form deep sections without any change in the gearing or other parts of the machine. On the other hand, when extremely deep shapes are formed, or a section becomes deep in the last few rolls only, as many of the top roll gears as required can be quickly converted into direct drive. This allows small rolls to be used to the greatest possible extent and makes for economy.

Where several different sections are rolled on one machine, means are pro-

Fig. 1—Kane & Roach Series L Cold-Roll Forming Machine shipped to Russia for hemming Ford running boards



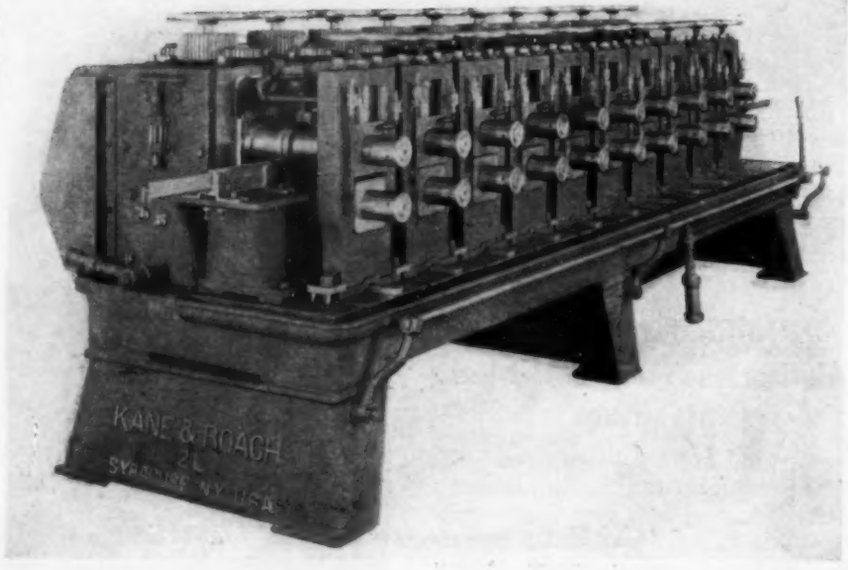


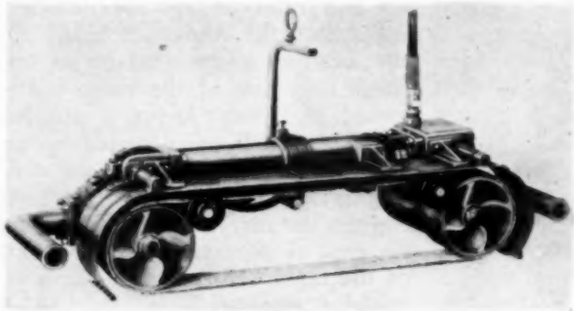
Fig. 2—In this Kane & Roach Series L machine, both shallow and deep sections can be rolled

vided for recording pressure settings. When changing from one job to another, little time is lost in arriving at exactly the right pressure on every stand of rolls for each shape.

"CP" Hicycle Portable Continuous Belt Sander

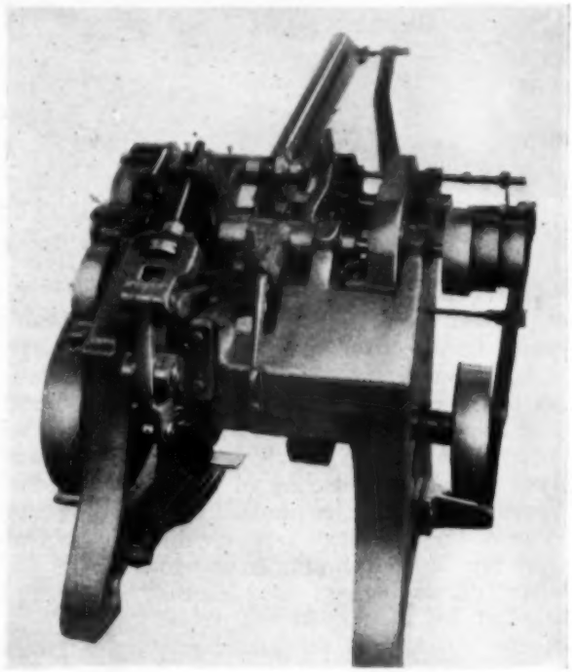
For grinding and polishing straight and curved surfaces in wood and metals, the Chicago Pneumatic Tool Co., 6 E. 44th St., New York, N. Y., is introducing a "Hicycle" portable, continuous belt sander. It is particularly useful in smoothing down welds, wood or metal panels, and large steel dies. A flexible, endless abrasive or polishing belt is driven by two Hicycle motors, one at each end. The motors have a very low slip or drop in speed, under load, so that the high cutting speed of the abrasive belt is maintained under varying loads or belt pressures. These motors are totally inclosed to prevent lubricant from getting out of the bearings or foreign matter from getting into the motor bearings, and work to be painted is not oil spotted.

The motors are held apart and the belt tension is maintained by means of a telescopic cylindrical structure actuated by compressed air. The motors run in synchronism. Therefore the load on the belt is divided equally. Ventilation of the motors is accomplished by means of fan blades cast in the driving pulleys. One switch, mounted on one of the motor housings, controls both motors. Handles on the ends and a suspension bail pivoted at the center of gravity provide convenient means for operating the sander in any position. The Pedwyn Balancer is recommended for suspending the belt sander over the work. The belt sander can be suspended at the point desired.



V & O No. 202½ Automatic Thread Rolling and Trimming Machine

Shells up to 6 in. in diameter by 6 in. in length can be handled on the No. 202½ automatic thread rolling and trimming machine announced by the V. & O. Press Co., Union Turnpike, Hudson, N. Y. The trimming attachment has capacity to trim $\frac{1}{16}$ in. mild carbon steel and other metals in proportion. Parts somewhat larger than described may be worked by hand feeding. Beading, knurling, scoring, and flat-side rolling can be done.



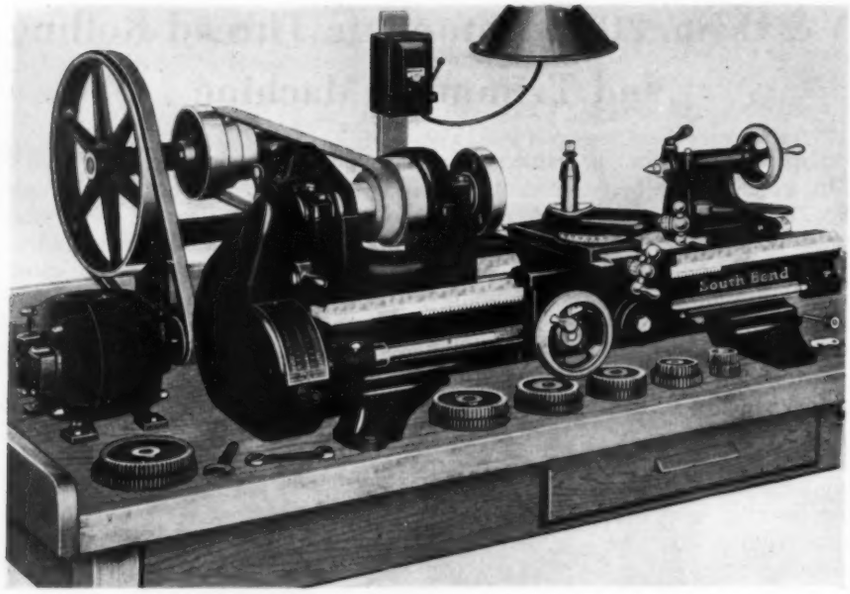
A single drive is used in this machine. The two clutch shafts and the rocker arm, which is operated from an auxiliary shaft, are driven through the same train of gears. The rocker arm is pivoted on trunnions instead of directly on the driving shaft, thereby relieving the shaft of the operating pressure and the resultant increased friction. Pressure is applied to the rocker arm directly in line with the upper chuck bearing to eliminate torsional strains. The rocker arm is actuated by an adjustable toggle motion, insuring smooth threads of uniform depth, and permitting a variation in the number of revolutions during which the work is held under pressure. This increases the range and the variety of work that can be handled. The rocker arm is brought into action by pressure on a treadle connected with the clutch. If the treadle is held down, the rocker arm will run continuously.

The spindles extend beyond the front of the bed to give free access to the chucks when it is necessary to feed work by hand. The spindle carrying the upper chuck is adjustable in and out, facilitating the matching of threads. Finished work is ejected from the chucks automatically, thereby increasing the speed of operation. When trimming operations are performed, means for the automatic separation of scrap are provided. The trimming attachment may be disconnected when the machine is to be used for threading or other work.

In addition to thread rolling and trimming, operations such as beading, knurling, scoring, and flat-side rolling may be performed with this machine. The tools required are inexpensive and quickly interchangeable.

South Bend 8-In. Junior Engine Lathe

An 8-in. junior back-geared screw-cutting lathe for general-purpose use in small shops and laboratories has been announced by the South Bend Lathe Works, South Bend, Ind. This unit is a precision lathe, and is available in countershaft and individual motor-drive styles. The lathe is built with a back-geared headstock with a



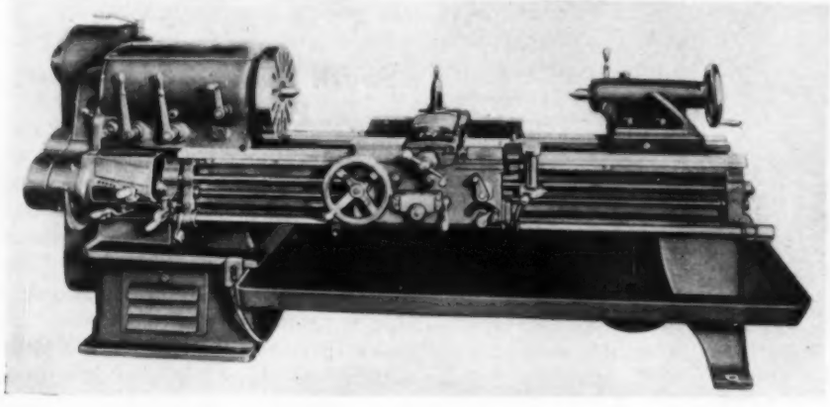
South Bend 8-in. Junior Engine Lathe equipped with a horizontal motor drive to give a self-contained bench unit for the small shop or laboratory

three-step cone providing six changes of spindle speeds. Three of these speeds are direct for light machining at high speeds, and three are back-geared for heavier work.

Among the mechanical features are: hollow spindle of alloy steel; Acme precision leadscrew of $\frac{3}{4}$ in. diameter; automatic longitudinal feed to the carriage; tailstock sets over for taper turning, and threads from 4 to 40 per in. may be cut. Bed lengths supplied are 24, 30, 36 and 42 in. Special attachments are available.

Reed-Prentice 16-Speed Sliding Gear Head Lathes

The Reed-Prentice Corp., Worcester, Mass., has added a line of 16 speed lathes in 14, 16, 18-in. heavy and 20-in. sizes to its line of 8-speed lathes. A new quick change gear mechanism provides all thread and feed changes without the use of pick-off gears. These features are also now standard equipment on 8-speed lathes of comparable sizes. The use of the four-bearing spindle mounting with precision Timken taper roller bearings have been retained, as well as other features of the 8-speed lathes.



Meaker Midget Processing Conveyor

A processing conveyor of small size for use in plating, pickling, rinsing, washing, lacquer dipping, and drying operations has been developed by the Meaker Co., 1615 So. 55th Ave., Cicero Sta., Chicago, Ill. This processing conveyor can also be used for the anodic treatment of aluminum, the Bullard-Dunn process, and or for any other process where a series of quick rinses, washes and dips are required, and where only limited floor space is available. It is particularly suitable for chromium plating. The greater the speed of the conveyor chain, the wider the application of this unit in the plating room, because of the shorter transfer period. For this reason one rack per carrier is usually recommended.

The conveyor is portable and its field of use lies between the semi-automatic and the return-type full automatic machines. The conveyor travels in horizontal loop, with the rack carrying arms pivotally mounted along the heavy chain. The carrying arm load is carried on a supporting leg cast integral with the carrying arm. To assure free and smooth travel for the loaded arms, a large-diameter, hardened steel roller is attached to the end of the supporting leg and rides on a track mounted underneath the conveyor chain. At the locations where transfer is desired, a section of the track is removed. A movable section is attached to oscillating levers actuated by an eccentric cam, thus forcing the supporting leg outward, which in turn elevates the carrying arm and causes the rack of material to be raised out of the tank. Plating racks have an effective length of 30 in.

Belleville Washer Loading—Graphical Determination

PUBLICATION of an article regarding Belleville or spring washers, used widely in Europe instead of helical springs for shock-absorbing or spring loading devices, (*AM*—Vol. 73, page 211) brought forth so many requests for additional information that several supplementary pages of material have been published. These include: Press tools for washer manufacture and loads to flatten various sizes (*AM*—Vol. 73, page 211), composition of a typical washer material, with suggestions for suitable heat-treatment and fabrication (*AM*—Vol. 73, page 710), properties of 133 sizes of washers (*AM*—Vol. 73, page 897), formulas for calculation (*AM*—Vol. 74, page 663). It is necessary to predetermine the working load that can be safely sustained by the washer without permanent deformation or fracture. The following formula is in common use and is less complex than most:

$$W = \frac{(D\text{-}d)\ t^{1.67}}{46h}$$

where: D is the external diameter of the washer in inches, d the bore in inches, h the height in inches, and t the thickness in sixteenths of an inch, and w the maximum load on the washer in tons.

This equation can be solved by logarithms, but a graphical solution is preferable to those having occasion to employ washers of this type frequently. The alignment chart on the following page allows dimensions and loading of a washer to be determined quickly and easily. The chart consists of six vertical parallel axes and one inclined axis. With the exception of CC' and EE', which are reference lines, the vertical axes carry logarithmically graduated scales.

$$\log W = \log (D\text{-}d) + 1.67 \log t - \log 46h$$

or

$$\log W - \log (D\text{-}d) = 1.67 \log t - \log 46h$$

The axis FF' is graduated in proportion to the values of log t. An index line dawn from any value of FF' through the point on the diagonal EF' denoted 1.67, if extended, intersects the axis EE' at a point indicating the value of $t^{1.67}$. As separate numerical values of this term are not required, EE' need not be graduated.

DD' gives values of h, but the graduations are spaced proportionally to the corresponding values of log $46h$. An index line drawn from a point on EE' representing a value of $t^{1.67}$ through a value of h on DD', if extended intersects the axis CC' at a point denoting the quotient of $t^{1.67} \div 46h$. Here again numerical values are not required.

To construct the chart, begin by tabulating the position of the principal graduations on each axis, choosing scales that can be encompassed by the dimensions of the chart. Draw the axes AA' and CC' parallel and at any distance apart, say 4 in. Graduate AA' logarithmically in terms of load W. A convenient scale value is 1 in. = 0.3 of a unit of logarithms. CC' is not graduated, but nevertheless must have a scale assigned to it in order that the position and scale for the axis BB' can be determined. Consider CC' to have a scale of 1 in. = 0.2 of a unit of logarithms. BB' bears a scale equal to the sum of those on its neighbors, namely 0.5, and must be located to satisfy the relationship:

$$\frac{\text{Distance between } A \text{ and } B \text{ axes}}{\text{Distance between } A \text{ and } C \text{ axes}} = \frac{\text{Scale on } CC'}{\text{Scale on } BB'} = \frac{0.2}{0.5}$$

Hence, if the distance between AA' and CC' is 4 in., BB' is 1.6 in. from AA'. Next, graduate BB' in terms of height h. Draw the axis EE' parallel to and say 6 in. from EE'. Join the diagonal EF' at any inclination, but preferably make it of some even length, say 10 in. Graduate FF' in terms of t, adopting scale value of 1 in. = 0.2 of a unit of logarithms.

The point marked 1.67 on the diagonal EF' must be carefully located so that the ratio of the distance to the graduation from F' to its distance from the point E is as 1 : 1.67. It will be found that, using given dimensions, the point 1.67 is 3.74 in. from F'.

The scale of the ungraduated axis EE' is the same as that on FF', namely 0.2. As CC' also bears this scale, it follows that the intermediate axis DD' is situated midway between CC' and EE' and is graduated to a scale of 1 in. = 0.4 of a unit of logarithms.

Thus far no vertical relationship connects the scales on the several axes, and before DD' can be graduated a datum must be established. This is done by choosing numerical values that satisfy the first equation. The following are selected for example: $W = 1$ ton, $(D\text{-}d) = 3.13$ in., $h = 1$ in., $t = \frac{5}{16}$ in. From $t = 5$ (a) on FF' draw an index through the point 1.67 (b) on the diagonal and extend it to meet EE' at (c). From $W = 1$ (g) on AA' draw an index line through $(D\text{-}d) = 3.13$ (f) on BB' and extend to meet CC' at (e). Join the points (c) and (e) and note the intersection with DD' at (d). The point (d) locates the graduation of unity on DD' and is the datum from which the axis is graduated.

Tabulated Values of the Principal Graduations

Maximum load W. Tons	1	2	3	4	5	6	7	8	9	10
Log W	0	0.3010	0.4771	0.6021	0.6990	0.7782	0.8451	0.9031	0.9542	1.0000
Distance to graduations on AA', $Sa = 0.3$, Inches	0	1.00	1.57	2.01	2.33	2.59	2.82	3.01	3.18	3.33
(Repeat scale for values $W = 0.1$ to $W = 1.0$)										
Difference $(D - d)$ Inches	1	2	3	4	5	6				
Log $(D\text{—}d)$	0	0.3010	0.4771	0.6021	0.6990	0.7782				
Distance to graduations on BB', $Sb = 0.5$, inches	0	0.60	0.95	1.20	1.39	1.56				
Height h, inches	$\frac{1}{4}$	$\frac{1}{2}$	$\frac{3}{4}$	1	$1\frac{1}{4}$	$1\frac{1}{2}$	$1\frac{3}{4}$	2		
Log $46h$	1.0607	1.3617	1.5378	1.6628	1.7597	1.8388	1.9058	1.9638		
Distance to graduations on DD', $Sd = 0.4$, inches	0	0.75	1.19	1.50	1.75	1.95	2.11	2.26		
Thickness t, $\frac{1}{16}$ inch	1	2	3	4	5	6	7	8	9	10
Log t	0	0.3010	0.4771	0.6021	0.6990	0.7782	0.8451	0.9031	0.9542	1.0000
Distance to graduations on FF', $Sf = 0.2$, inches	0	1.50	2.38	3.01	3.49	3.89	4.22	4.51	4.77	5.00

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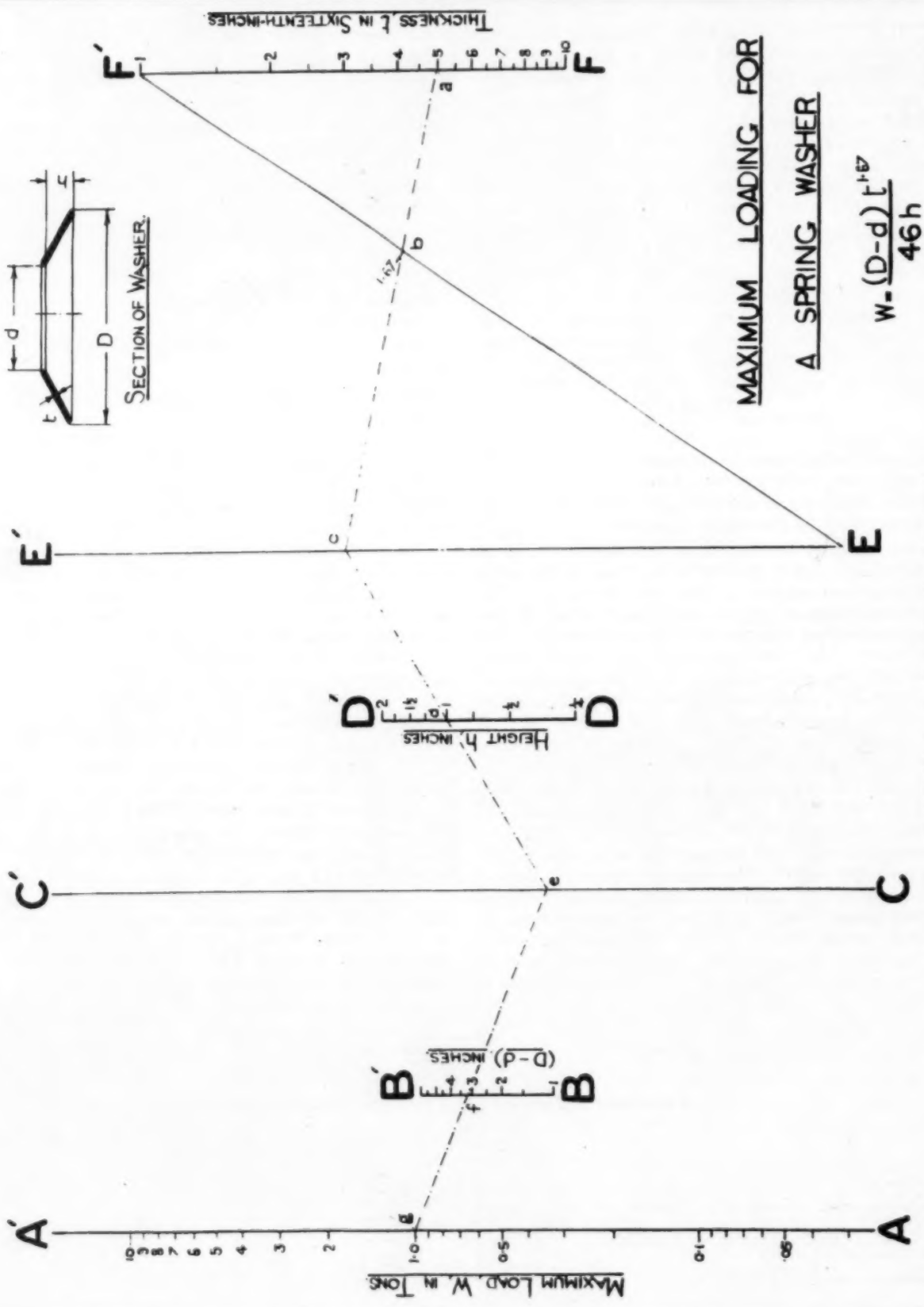
Belleville Washer Loading—Graphical Determination



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AMERICAN MACHINIST

Editors: KENNETH H. CONDIT AND FRED H. COLVIN

New York, December 31, 1931

VOL. 75 NO. 27

A Year Can End

In just a few hours another year will pass away. Though we may eventually look back on 1931 as the year when the world rediscovered that there are no enduring substitutes for keen thought, hard work and genuine cooperation, more individuals will celebrate than mourn its passing.

No self-respecting prophet would have the temerity to forecast the new year. But it is our considered belief that if all Americans will think and work and pull together as they have already proved themselves capable of doing, they will lead the world out of misery into prosperity. A year can end in many ways. If the right groundwork is laid during the first three months, 1932 will confound many a defeatist and habitual mourner.

Records vs. Memory

Nothing is quite as convincing in clinching an argument as an actual record of performance. No matter whether it be the cost of castings, the durability of other materials or the results of certain practices, cold facts as shown by records are hard to gainsay.

Many records are of doubtful value, to be sure, and many reports are merely post mortems that cost money and do little good. But those responsible for results in either production or repair work will find records of great value. The cost of tools of different kinds in production or the cost of maintenance in repair work show clearly the way to true economy. Memory is influenced largely by recent happenings, but records give one an opportunity to compare costs over long periods and so to form a saner and better judgment.

Records do not need to be elaborate; they must be accurate. Entries should be made before there is any opportunity to forget dates or details. We recently saw a record book of machine failures extending over a period of twenty years. It was not a large book, entries often being confined to a single line. But the facts there recorded shaped the buying policy that guided the purchase of thousands of dollars worth of materials and machines.

Expert Opinion

Interesting indeed is the report of the committee of experts appointed to pass expert judgment on the merits of the conflict between experts that led Dr. Ray Hall of the Department of Commerce to make accusations against that department which were widely quoted at the time. Dr. Hall accused the heads of this department of suppressing certain parts of a report made by him in order to throw a more favorable light on administration policies. A committee appointed by the president of the American Economic Association investigated the charges and exonerated the department heads. It found that they were justified in deleting certain passages on which expert opinion differed. In view of the ruthless manner in which economic events have disregarded expert economic opinions and prognostication it is hard to see how even a committee of experts could have found otherwise. It has been a tough year for expert opinions.

Bargain Research

The A.S.M.E. Special Research Committee on gears requests suggestions as to its future research work. Thus, there would seem to be present a remarkable opportunity for manufacturers interested in this work. As Ralph E. Flanders, chairman of this committee, has pointed out, an excellent set-up for future study exists. The testing machine originally designed by Wilfred Lewis is available as are the other lab-

oratory facilities at the Massachusetts Institute of Technology; Prof. Earle Buckingham is able to devote a portion of his time to the direction of this work. Only a nominal sum is needed to cover the cost of materials and the salary of a permanent assistant.

The committee is anxious to formulate a research program that will be of greatest practical value to manufacturers. Firms interested should advise Mr. Flanders of the particular phases of gearing in which they are most interested, whether they be helical, bevel, or worm gearing, gear materials, or gear friction losses. In these times, when so much individual research has been curtailed, this opportunity for a cooperative study on so important a subject should not be neglected.

◂◂ CHIPS ▸▸

A green Christmas here on the seaboard . . . augurs well for the New Year . . . Despite the fact that Bromo-Selzer has been able to declare an extra dividend, there are indications that business men and politicians are beginning to use their heads for something besides headaches . . . President Hoover signs moratorium relieving Europe of 252,000,000 dollars of war debts for the time being . . . and the Congress adjourns for two weeks . . . Administration decides to continue its reparations policy by taking no part in forthcoming reparations parley . . . will await a definite European program . . . Senate Committee on Banking and Currency criticizes all banks for their part in the disastrous speculation of 1929 . . . Copper producers agree on world-wide limitation of production . . . output to be reduced "very slightly."

In one day 61,000 sq.ft. of floor space is allotted exhibitors at the 1932 Machine Tool Show . . . presages bigger show than the record breaker of 1929 . . . Winchester reorganization completed . . . ready to function on larger scale under new ownership of Western Cartridge Company . . . One of the original "slow trains through Arkansas," the Doniphan, Kensett & Searcy, sells out to Missouri Pacific . . . Engineers recommend consolidation of several south Jersey railroads . . . would save 1,700,000 dollars annually . . . Pennsylvania officials express approval . . . Denver Pacific R.R. petitions I.C.C. for permission to build a brand new 800 mile line from Denver to Los Angeles . . . A French locomotive and coach, both equipped with pneumatic tires, arrive for American inspection . . . Reported that "American Motors Corporation" is in the negotiation stage . . . companies said to be included are Hudson-Essex, Studebaker, Pierce-Arrow, Nash, Willys-Overland and Electric Auto-Lite . . . Fire destroys Altoona shops of Pennsylvania Railroad . . . loss in buildings and equipment put at 1,500,000 dollars . . . Coast-to-Coast air fares reduced to rail fare levels . . . New York-Chicago fare reduced from $59.50 to $47.95 . . . New Coast-to-Coast 24-hour mail service begins tomorrow.

Citroen demands complete French embargo against foreign cars . . . His mother country contemplates cutting her annual war debt payments to the U. S. from 50,000,000 dollars to 20,000,000 . . . all as per proviso in the Mellon-Berenger settlement . . . Uncertainty and gloom seem to pervade London markets . . . degilding the pound sterling and elevating tariff walls may be nostrums rather than panaceas . . . Certain Englishmen begin to yearn for free trade . . . Germany greatly encouraged by the unanimous Young Plan report . . . Swiss Federal Railways adopt big construction program for 1932 . . . more double tracks and electrification . . . 86,000,000 Swiss francs worth . . . Japan prepares to consolidate her gains in Manchuria.

> "At the present time a pent-up demand is being created just as in the years following the war. We do not know when the demand will assert itself for our products, but its eventuation is confidently anticipated."
>
> —CLARENCE M. WOOLLEY, *Chairman American Radiator & Standard Sanitary Corporation*

Otis Elevator Company secures 750,000 dollar contract for 42 elevators in Port of New York Authority Building . . . Mueller Brass Company reports 296 per cent increase in sales of streamline copper pipe and fittings for fiscal year ending November 28, 1931 . . . In nine months of 1931, International Business Machine Corporation pays 2,000,000 dollars in dividends and adds 1,589,000 to surplus . . . Bethlehem Steel awarded 400,000 dollar contract to convert Reading passenger coaches into trailers . . . Edward G. Budd Mfg. Company will have a January, 1932, payroll of 800,000 dollars . . . almost double January, 1931 . . . Lycoming begins twelve cylinder production on its new million dollar production line . . . reports sharp in-

crease in aircraft engines on order . . . 673,000 dollars worth on books against 145,400 in December, 1930 . . . Studebaker continues to expand employment . . . now employs 9,000 men on nine-hour day basis . . . Autocar secures 486,000 dollar truck order from New York City Sanitary Commission . . . second big order this year from the same source . . . Motor Wheel Corporation operates pressed steel division on 24-hour basis . . . adds 300 men to its force . . . Bendix Aviation Corporation is expected to expand payrolls beyond previous peak levels . . . Voss Brothers Mfg. Company winds up its biggest year . . . a 60-dollar washing machine the answer . . . Stinson Aircraft Corporation looks forward to capacity production . . . adds 300 workers . . . makes 1932 material commitments totalling 2,500,000 dollars.

Senator to Devote Recess to Study of Economics —Headline. Which stirs mixed emotions. Are Senators going to admit that there is such a science as economics? Are they going to "master" it in two weeks, like Bryan's famous millions leaping to arms overnight? But the headline writer missed his cue, or else the typesetter did him dirt, for down in the article it says that the Senator will study economies and not economics. Perhaps it is just as well.

THIS WEEK IN *AM*

It has been said before, but it will probably not do too much harm to say again that this issue is the 53rd of this rapidly expiring year, 1931. Having fulfilled our subscription contract to the letter with 52 full issues, we are deliberately taking liberties by publishing three consecutive articles on economics this week. But in the same breath we submit that they are of the highest caliber—authoritative and at the same time easy to read.

As was stated in the foreword, "Economics with a Big E," we did so only after repeated requests. Two of these came from the heads of two of the largest and most successful machine tool builders in the country; one came from a man high in the councils of one of our largest electrical manufacturers; another from an experienced consulting engineer—we cannot enumerate them all. These are all men whose recommendations are worth listening to. We believe that you will second their motions and call for a rising vote of thanks.

"Economic Aspects of Stabilization" (page 982) goes far beyond a bare discussion of the subject. It goes to the heart of things. "The Unemployed—What Shall We Do with Them?" (page 988) presents practical working plans by a man who has had the widest kind of experience in employment and unemployment. "New Roads to Prosperity" (page 996) points out the guideposts that all who run may see. Thus we have represented the mature views of an economist, a manufacturer, and a banker—three leaders in their respective fields. As an added feature we include Edward Adams Richardson's able discussion of Ralph E. Flanders's Machine Tool Builders Association address (page 995).

The Reference Book Sheet is quite another thing (page 1015). In it will be found more data on the subject of Belleville washers, those peculiar cup-shaped devices so largely used in Europe in lieu of coil compression springs. Shop Equipment News is full to overflowing this week.

• COMING •

Tonight we celebrate the passing of the old year; tomorrow we welcome the new. "Let the dead bury their dead"—the editors of *American Machinist* have not the heart to hold a post mortem. Their reviewing will be confined to the living subject of the new machine tools and shop equipment placed on the market since the last Semi-Annual Shop Equipment Review of July last. This will appear January 21 without fail.

The first issue of what promises to be a year of come-back and reconstruction will come on January 7. For it we have selected a group of articles which will point the way to new progress. "Rolling" has not yet taken hold in America as it has in parts of England and the continent. One of our most competent English contributors has been persuaded to provide us with the last word on the subject. Lots of our plants roll screws, but wait until you see what his "works" has done.

Cast iron is finding another field in dies for forming and even in forging. Economies are remarkable. The article you will see next week will contain all the formulas, all the procurable data.

Tungsten carbide will be represented by a thorough analysis of successful practice in a plant using vast quantities of it. A new high temperature conversion chart will be released as the Reference Book Sheet. We like to be modest, but we really think that every *AM* reader will find something in the issue to put into practice in his own daily work.

Progress in Metal-Working and Machinery Markets

SOMNOLENCE characteristic of any turn of the year has gripped most districts . . . There is plenty of optimism in all sections of the country, although the cry is still the same "We will buy when business gets better." . . . Too few seem ready to aid in that bettering of business by buying now . . . Thus tool builders find themselves stocked with finished units and with production costs increasing with single-unit manufacture . . . The general opinion is that the first of the year will mark the beginning of an accentuated spring upturn, and that this betterment will continue through the year.

NEW YORK, as usual, celebrated the Christmas week strictly at home—no tools worth mentioning being sold and few prospects developing . . . Chicago has a like condition, with inquiries dropping off and little expectation of change until mid-January . . . Milwaukee, on the contrary, had a December that continued the November upturn, sales coming from automobile, tractor, farm implement, electrical and Government sources . . . One concern there had the first three weeks of December better than a fairly good November . . . Detroit holds about even, with bettered car manufacture showing as yet no effect on tool buying.

NEW ENGLAND duplicated Milwaukee's betterment and from somewhat the same sources . . . Philadelphia, ever hopeful, sees some reason for optimism in the Washington situation and in the new year . . . Buffalo, with sales of single machines, believes that hand-to-mouth buying is doomed and that the first of the year will be welcome . . . Cleveland expects an upturn, led by automobile manufacturers . . . Cincinnati is of a like mind, but in neither district have sales been better . . . Southern District is likewise slow.

NEW YORK

Tool dealers are awaiting the turn of the year with optimism. As is usual, Christmas-New Year week produced little business, and little is expected for several weeks—at least until annual inventories and other excuses for postponement are worn thin. No inquiries have developed and sales are all small tools and repair parts.

PHILADELPHIA

The holiday spirit settled down last week, leaders of the industry giving attention more to preparation for enjoying Christmas and the coming of the new year than to plans for increasing sales. Opinion prevails among leaders of the industry that the new year will witness a partial revival of business. They regard the situation in Washington in a favorable light, and are hopeful for legislation that will aid business.

BUFFALO

The holiday season finds the trade in fairly good condition. There has been little or no buying, but this is considered purely a seasonable condition, and good business is expected after the first of the year. Buying early in the month was of single machines—equipment absolutely necessary despite the proximity of the year-end. Inquiries for equipment after the first of the year indicate that the early part of 1932 will be better than the last part of 1931. There is increasing evidence that buying on a hand-to-hand basis has serious faults.

CINCINNATI

During the concluding days of the year the machine tool business thermometer has been down near zero, but it cannot be said that this condition was unexpected. Manufacturers and selling agents booked a few scattered orders for single items and received an occasional small inquiry. Plans are being made for vigorous merchandising efforts the coming year, with the hope that a gradual increase in sales will result.

CHICAGO

Such little business as has been developed recently has given place to the usual holiday season lethargy, more accentuated this year than for a long period. Inquiries have become fewer, and little expectation of any change in an upward direction, at least until mid-January, is expected. Notwithstanding, there still obtains a feeling of optimism regarding the not-distant future.

CLEVELAND

The machine tool industry is entering the new year with more optimism than it has displayed in the last six months. They expect to see a slow steady upward trend during January, February and March of 1932. It is pointed out that the number of pending inquiries is very large and a certain percentage of them will be closed when appropriations for the new year are made. Another factor they consider is the replenishing of depleted stocks after inventories are completed.

NEW ENGLAND

The current week displayed no increase in the volume of orders placed, a natural expectation at this period even in better years; but December has really resulted in improved sales as compared with November. All gains have been small but sufficient to create new optimism as a new year breaks. Increased inquiry is stimulating an otherwise dull situation; and, quite naturally, is the source of this new optimism. Prospective orders are reported from the Navy, automobile builders and electrical companies.

DETROIT

Almost no change has been recorded in the last two weeks. The end of the year did not bring the slowing up of business that has come in other years, principally because the automobile industry is busier than it has been for several months. In most lines sales have been so scattered and so unimportant that dealers find it hard to imagine any considerable let-down. They do, however, look for a slight quickening of business in January and February. Automobile manufacturers are producing a good many cars in preparation for the shows. Some of the contract work has been causing the small jobbing shops to make changes in their equipment. Neither these changes nor the changes made by the big plants have involved the purchase of expensive new tools or machinery but dealers still believe these purchases will soon be necessary.

MILWAUKEE

December continues to show the improvement noted in November and reflects the trend towards better conditions which began during October and September. One manufacturer reports the first three weeks in December 20 per cent above a fairly good November. Others report the month as holding its own, while one or two others say "Only fair." While few venture comparisons, several estimate that 1931 will be about 40 per cent of the preceding year. Orders are being received, usually for immediate delivery, which is taken to indicate absolute needs and to eliminate the possibility of cancellations or postponement. In addition to live inquiries from automotive sources, several automobile manufacturers have already placed orders for tool room equipment. Some orders have been placed by tractor manufacturers, while farm implement producers are making inquiries. Orders have also come in from electrical manufacturing concerns. Government business is showing favorably with sales for the Dayton airfield and good prospects for the Navy to make commitments soon. There are some single orders from general industrial sources.

WEEK . BY . WEEK

BUSINESS BAROMETER

Trends in General Business throughout the world

THEODORE H. PRICE
Editor, Commerce and Finance, New York

On Monday, Dec. 21, Viscount Cecil of Chelwood made an address in London that was broadcast throughout the United States. As heard in New York this address included the following statement:

"The nations of the world today are more than ever dependent on one another. That is the literal truth socially, economically, culturally. The States of the world, and especially of Europe, are almost as much a part of one another as the component countries of the United Kingdom. No better example of this truth can be given than that of armaments. National armaments exist for two objects: internal order and external security."

This address was intended as a prelude to the general Disarmament Conference which meets in Geneva Feb. 2, and it appears to be one of a series of several such speeches in which men of affairs and influence will endeavor to promote the cause of peace by putting the consequences of war before the people of the world. This work is now being so ably carried on that a definite impression has been made upon the forces of militarism, and despite the clamor raised in Congress it is plain that in America at least there is a disposition to consider the cost of war before taking any action that might involve a resort to arms as a method of settling international disagreements which may hereafter arise.

Outlook Improved

For this reason the outlook appears to have improved during the past week. The pessimists were somewhat surprised by the promptitude with which the House and Senate acquiesced in confirming President Hoover's proposed moratorium, and the Congressmen who voted for it seemed to be rather proud of the speed with which the necessary action was taken. Those who are opposed to any further revision in the reparations to be paid during the next sixty-odd years are endeavoring to impress their views upon the nation, but close students of politico-economic tendencies feel that the voters are predisposed to settle the question and get it out of the way as promptly as possible. There is, therefore, a disposition to consider tolerantly any workable proposals that will lead to the settlement and elimination of the most important issue that the world's statesmen have had to deal with since the declaration of war in 1914.

This tendency is so obvious that it is likely to find a wider acceptance when Congress reconvenes, and the political decks are being cleared for the Presidential campaign of 1932. For these reasons many who were formerly pessimistic are now commencing to be more hopeful.

There was a distinct improvement in the demand for bonds and common stocks, and though Wednesday brought a relapse prices are still well above recent lows. Some of the commodities have lost a little ground since the end of last week, but cotton is showing a firmer tone; grain and silver have receded somewhat, and sugar, after declining to new low levels firmed up somewhat and the market is now waiting for the conference of producers to reconvene in Paris. There is a widespread feeling, however, that any substantial improvement in the value of this great staple must wait upon a further reduction in the area to be planted and harvested next year.

More for a Dollar

Distributive trade in the United States is fully up to expectation, but it is chiefly of the Christmas variety, and its volume as expressed in dollars and cents is said to be somewhat disappointing. But there is an increased willingness to realize that economy is the road to wealth and the reduction that has been effected in the cost of living during the recent past is making it possible to get a great deal more than would formerly be obtained for a dollar.

These are a few of the many reasons that are advanced to explain the more cheerful tone that has been generally reported in commercial and industrial circles. It may be that the change is entirely emotional, but people are commencing to realize that declining prices do not necessarily mean the destruction of wealth and that in the last analysis we are made richer by our ability to produce and consume more than formerly. Some may challenge this statement, but it cannot be denied, and the prevailing willingness to accept it may be responsible for a quiet increase of cheerfulness that is now somewhat noticeable.

Even less is heard of unemployment, which probably reflects the efficacy of the efforts made for its relief. Of course, the flotsam and jetsam of the recent storm will continue to be more visible on the surface of the sea until the trade winds commence to blow again and the wreckage of the past is submerged.

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THE BUSINESS WEEK

December 30, 1931

Prospect of prompt stabilization and progressive strengthening of the domestic financial situation is the most promising spot in the business picture as 1931 passes unlamented into oblivion . . . Financial difficulties growing out of uncontrolled deflation emerged as the most formidable factor frustrating domestic readjustment during the past year . . . So far as foreign influences have played a part in postponing recovery there is little progress to be hoped for, and probably only further disturbance to be anticipated from this source . . . But indications of energetic action on establishment of the Reconstruction Corporation after the congressional recess, intelligent private support of the bond market evidently under way in the interval, and early relief for railroads through rate and wage adjustments, justify expectations of improvement in the domestic picture early next year . . . Its extent depends upon how promptly and powerfully pressure is applied to reverse deflation and replace and expand credit in use, and how strongly deferred private industrial demand will draw it into employment for replenishment of depleted inventories and improvement and extension of facilities . . . Sources of such demand on a large scale are difficult to see at the moment, but they have always been so at a similar stage of depression, and will doubtless appear in due course as confidence is restored by better banking conditions . . . If they do not, the creation of new credit resources through government action cannot of itself quicken business expansion, and should private initiative in their application prove insufficient it will become necessary to put them to work through public channels, since recovery is inconceivable in any other terms than the increased use of credit.

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Material Trends and Prices . . . .

Railway material and ship plates form the bulk of tonnage now being placed for first-quarter delivery. Automotive purchases appear to be below expected volume, while other lines of consumption are feeling the effects of seasonal quietude. Bar prices remain fairly firm but there is marked weakness in quotations for other heavy-rolled products at mills. Fabricated brass and copper products moved upward this week, in response to strengthening of non-ferrous metals prices generally.

(All prices as of Dec. 26, 1931)

IRON AND STEEL

Pig Iron —	Current	Mo. Ago	Yr. Ago
Birmingham, No. 2, Fdry., per gross ton	$11.00	$11@$12	$14.00
Buffalo, No. 2, Fdry., per gross ton	15.00	17.00	15.25
Heavy Melting Steel Scrap — Pittsburgh consuming point, No. 1, per gross ton	10.00	10.00	12.75
Furnace Coke — Connellsville, per net ton	2.25	2.40	2.40
Foundry Coke — Connellsville, per net ton	3.25	3.25	3.50
Steel Shapes — Pittsburgh, base, per 100 lb	1.50	1.60	1.60

Iron Machinery Castings — Cost in cents per lb. of 100 flywheels, 6-in. face x 24-in. dia., hub not cored, good quality gray iron, weight, 275 lb.:

Chicago	4.62½	Cleveland 4.50	New York 4.75
Cincinnati	4.35	Detroit 4.00	

Steel Sheets — Prices in cents per lb., del. from warehouse stock (except at Pittsburgh) in lots of 401 to 999 lb., ordered and released for shipment at one time:

	Pitts. Mill	Chicago	Cleveland	New York
Blue annealed, No. 10	1.85	3.20	3.00	3.40
Black sheets, No. 24	2.40	3.55	3.60	3.50
Galvanized, No. 24	2.90	4.10	4.00	4.00

Seamless Steel Tubing — Cold-drawn mechanical tubing, round, .10 to .30 carbon, in lots of less than 100 ft. or 100 lb., net, at N. Y. warehouse:

Thickness of Wall		Outside Dia. in Inches						
		⅜	½	¾	⅞	1	1¼	1½
Inches	B.w.g.	Price per Foot						
.035	20	$0.15	$0.16	$0.17	$0.18	$0.19	$0.21	$0.23

Shapes, Plates, Bars, Etc. — Warehouse base prices in cents per lb., del. in lots of 401 to 999 lb., ordered and released for shipment at one time:

	New York	Cleveland	Chicago
Bands	3.40	3.00	2.95
Bars, soft steel	3.10	2.75	2.75
Cold fin., flat or square	3.90	3.60	3.60
Cold fin., round or hexagon	3.40	3.10	3.10
Cold rolled strips	4.95	6.00	5.50
Floor plates	4.85	5.00	5.00
Hoops	3.75	3.65	3.50
Rivets	4.00	4.00	4.00
Shapes	3.10	2.95	3.00
Spring steel	4.00	4.00	4.00
Tank plates	3.10	2.95	3.00

Stainless Steel — Hot-rolled bars, base, Pittsburgh. 0.12 per cent carbon, cents per lb.:

Chromium 15% and under	19.00	Chromium 18 to 23%	23.00
Chromium 15 to 18%	20.50	Chromium 23 to 30%	28.00

Bolts and Nuts—Discount from list, f.o.b. mills, Birmingham Chicago, Cleveland and Pittsburgh, on bolts (except tire and stove) nuts, and lag screws, mill lots 73-10-10%

NON-FERROUS METALS

Prices following are in cents per lb. for mill shipments in carlots:

Aluminum ingots 99%, N. Y.	23.30
Copper, electrolytic, Conn.	7.25
Copper wire, base, Chicago and Cleveland	9.37½
Copper wire, base, N. Y.	9.25
Lead, pigs, E. St. Louis	3.55
Tin, Straits, pigs, spot, N. Y.	21.75
Zinc, slabs, E. St. Louis	3.15

Prices following are in cents per lb., base, N Y., Chi. and Cleve.:

Brass rods, high	11.00
Brass sheets, high	13.25
Brass tubing, high	16.50
Copper, drawn round	13.87½
Copper sheets	16.37½
Copper tubing	15.87½

Prices following are in cents per lb., del. from N. Y. warehouse:

Babbitt, anti-friction, general service	28.50
Babbitt, com'l, intermediate grade	34.25
Babbitt, genuine, highest grade	43.00
Solder, bar	16.87½

Prices following are in cents per lb., base, Huntington, W. Va.:

Monel metal rods, hot rolled	35.00
Monel metal sheets, full finished	42.00
Monel metal tubing, seamless	65.00
Nickel rods, hot rolled	45.00
Nickel sheets, full finished	52.00
Nickel tubing, seamless	75.00

Scrap Non-Ferrous Metals — Dealers' purchasing prices in cents per lb., f.o.b. cars:

	New York	Cleveland	Chicago
Heavy yellow brass	2.50	2.50	2.75
Light brass	2.00	1.75	2.25
No. 1 rod-brass turnings	2.75	2.75	2.50
Heavy copper	5.00	4.25	4.00
Light copper	4.00	3.75	3.75

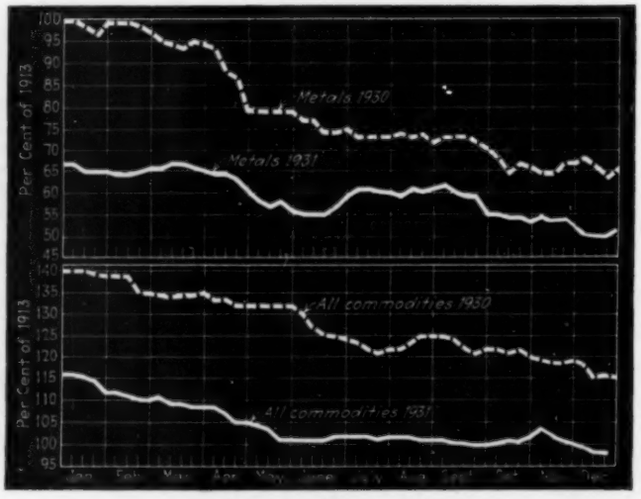
SHOP SUPPLIES

(Prices at warehouse)	New York	Cleveland	Chicago
Abrasive disks, aluminum oxide No. 50 grain, cloth, 6-in. dia., X weight, per 100	$4.37	$4.59	$4.59
Belting, leather, heavy	30–10%	40%	40%
Belting, rubber, trans., Grade 1	60–10–10%	60–10%	60%

Lumber — Per M ft., b.m., 12-16 ft. lengths, delivered, N. Y.:

Crating — Southern pine:
1x4-in. $27.00 1x6-in. $26.00

Skids—Spruce:
2x4-in. $35.00 3x4-in. $35.00 4x6-in. $37.00 6x6-in. $50.00



Price Movements Week by Week

Average Price of Raw Metals: Pig Iron, Billet Steel, Copper, Tin, Lead, Zinc—American Machinist
Seventy-Four Commodities Index—The Annalist

NEWS

Metal-Working Machinery Shows Best in Exports

Machinery was the only principal item of American manufacture to show an increase in value during the first nine months of this year. This group, valued at $30,164,000, has been advancing steadily throughout the year and shows an increase of 54 per cent above the 5-year average value. Larger exports of various kinds of lathes, gearcutting, grinding, sheet and plate, forging machines, and rolling-mill machinery, particularly to Soviet Russia, contributed to the increase.

Power-driven metal-working machinery was one of the few items showing an increase in value of exports for the first nine months of 1930 and 1931. Exports in the first nine months of 1930 were $29,330,000; these in the first nine months of 1931 were $30,164,000, an increase of 2.8 per cent. Automobile parts and accessories for the same period dropped off 46.6 per cent, electrical machinery and apparatus dropped off 26.8 per cent in exports. These figures are included in the bulletin, "Our World Trade," issued by the Chamber of Commerce of the U. S.

Exports of construction and conveying machinery were 50 per cent less than a year ago and 38 per cent below the 1926-1930 average; oil-well and refinery machinery was 54.7 per cent less than in 1930 and 36 per cent below the average, and mining and quarrying machinery declined 30 per cent below 1930 and 26 per cent below the 5-year average value.

Government Employs More Engineers

A substantial increase in the employment of professional engineers by the Federal Government in the face of industrial depression is disclosed by report of a survey of the American Engineering Council. The Government has not only avoided decreases in wages and salaries, but has actually increased materially the total number of employees in 34 bureaus, divisions and independent establishments. The Government is now employing 7,064 professional engineers in bureaus and divisions which employ over 135,000 men and women, an increase of 55.7 per cent in the past five years. There has also been an increase of 29.6 per cent since 1929. In the five years also the total number of employees in the same agencies has increased approximately 23.7 per cent, or 11.2 per cent since 1929.

Engineers Find Work By Rutgers Plan

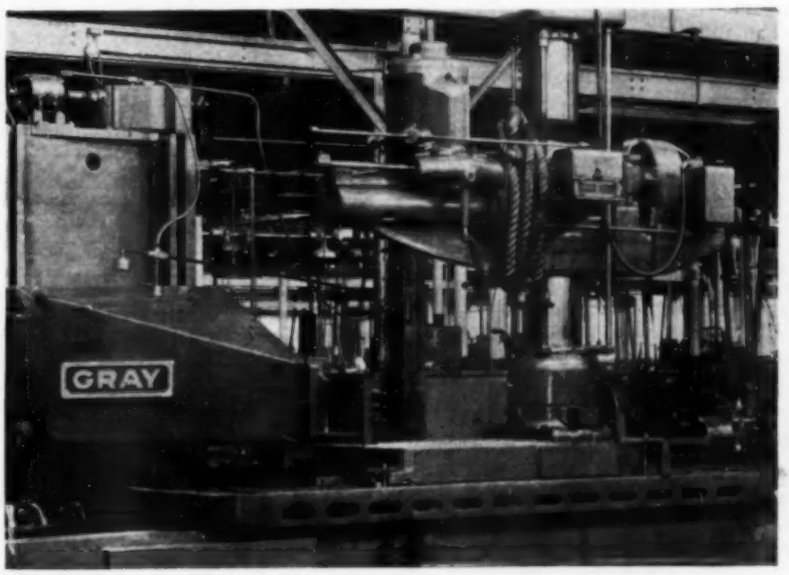
P. H. DAGGETT, dean of the College of Engineering, Rutgers University, has adopted a plan to provide employment for engineers. He has received authorization for the appointment of six special research assistants for the Spring term in the College of Engineering at Rutgers. These assistantships will carry a stipend of $150 and exemption from all tuition fees. Four of these assistants will be used in part-time work on the following projects: (1) Study of the velocity of flow and sedimentation in tanks; (2) Study of New Jersey sands for building purposes; (3) Study of slag as a material for sprinkling filters; (4) Breakdown law for rubber insulated wires, and the other two assistants will be assigned to problems to be chosen by the applicants. Applicants for appointment must be graduates of recognized colleges of engineering and must present a certificate from the New Jersey State Committee of American Engineering Council that they are worthy of assistance.

Borsig Works Fails; Big German Machine Plant

Borsig Works, Berlin, Germany, celebrated German machinery plant, failed Dec. 18. This company, privately owned, is second in size only to Krupps, and is nearly 100 years old, with a capital of 10,000,000 marks (normally $2,400,000) and employing, at times, as many as 15,000 workers. The plant sold every year, at the height of its success, $10,000,000 worth of locomotives, generators, turbines, compressors, pumps, refrigerators and industrial machinery, 80 per cent of it going abroad. At present the Works is employing 3,700 men and has orders on hand to the amount of 12,000,000 marks (approximately $4,700,000).

Auto Shop Tools Set for 4th Floor

Shop equipment at the New York Automobile Show will be exhibited on the fourth floor of the Grand Central Palace. It will be confined to the trade until 5 P.M. each day, after which time the general public will be admitted. Among the exhibits will be new electrical and mechanical machines for scientifically locating troubles that formerly were found only through a process of elimination.



It takes a big one to trim a big one. A large-size open-side planer taking a clean-up cut on the table of a completely assembled radial drill in the Kearney & Trecker plant. On account of inertia effects of the column, the slowest planer speed is used—10 ft. per min.—but even at that the whole job is only a matter of a few hours

Third Machine Tool Show Definitely Launched

The Machine Tool Show, to be held in Cleveland, Sept. 10-17, 1932, is on its way. The Exposition Committee of the National Machine Tool Builders' Association, meeting in Cincinnati, Dec. 18, conducted a space lottery resulting in the definite location of 110 member exhibits in the West Annex, a division of the Cleveland Public Auditorium building group in which will be concentrated the member exhibits of machine tools. Allotments made in the one day involved 61,000 sq.ft. of display space, exclusive of aisles and registration quarters.

This means, according to RALPH E. FLANDERS, chairman of the Association's Exposition Committee, that the Third Machine Tool Exposition will be the match of the second show in 1929, and may possibly exceed that exposition. According to exposition rules, machine tools may be exhibited only by members who have enjoyed good standing since Sept. 1, 1930. Machine tools are defined by the association as "power-driven complete metal-working machines, not portable by hand, having one or more tool or work-holding devices used for progressively removing metal in the form of chips."

Other exhibits, applications for which will be considered within the next few weeks, may include the following classifications: other metal-working machinery; direct accessories; business papers and managerial services; component accessories.

The Machine Tool Show in 1929 brought together for inspection by 20,000 men of the metal-working industry the greatest assemblage of modern production tools thus far assembled. More than 250 companies were exhibitors at that show.

The full committee on Exposition of the Association was present throughout the allotment: Chairman, RALPH E. FLANDERS, Jones & Lamson Machine Co.; G. E. RANDLES, The Foote-Burt Co.; W. P. KIRK, Pratt & Whitney Co.; O. B. ILES, International Machine Tool Co.; J. G. HEY, Avey Drilling Machine Co.

ROBERT M. GAYLORD, Ingersoll Milling Machine Co., who until recently elected president of the Association had been a member of the Committee on Exposition, was also present throughout much of the allotment procedure.

Italy An Important Buyer of German Machine Tools

In the first nine months of 1931 Italy has become Germany's third best customer for machine tools, after the U.S.S.R. and France, thus having surpassed Belgium and Great Britain. January-September, 1930, Italy purchased 4,440 tons of German metal-working machines; January-September, 1931, 5,132 tons. During the years 1928 to 1930 Germany was Italy's leading supplier of machine tools. The German share of the bulk of Italy's total imports of machine tools was about 69 per cent in 1930, compared to only 59 per cent in 1929. It can thus be maintained that the German machine tool industry has made good progress in Italy during the last year. Non-automatic machine tools were imported by Italy as follows:

1928:	5,767	tons, value	$3,186,452
1929:	7,690	tons, value	4,660,098
1930:	6,362	tons, value	3,542,842

and automatic machine tools:

1928:	446	tons, value	$410,411
1929:	595	tons, value	597,162
1930:	458	tons, value	457,308

As demonstrated by the following table of the total machine tool imports of Italy during the years 1928-1930, the keenest competition on the Italian market has been between the United States and Germany, with Austria and Czechoslovakia advancing well; Belgium, Switzerland, Holland, France and Great Britain have, however, suffered losses in their sales to a greater or lesser degree.

	1930	1929	1928
	Tons		
Germany	4,732	5,735	3,693
Germany reparation account	26	61	1
U. S. A.	1,040	1,301	905
France	382	431	555
Great Britain	221	380	239
Switzerland	144	179	291
Belgium	91	62	389
Austria	157	91	78
Czechoslovakia	17	2	7
Holland	1	2	5
Other countries	35	103	51
Totaling	6,846	8,347	6,214

In the meantime, Italy is striving to build up its own production of certain machine tools, and this tendency makes itself noticeable in the figures of Italian machine tool exports, viz.: in 1928 Italy exported only 344 tons of non-automatic machine tools, worth $113,379. This was increased to 519 tons in 1929, valued at $187,072, and the world crisis of 1930 caused a decrease of exports by only 19 tons, to 500 tons, worth $178,315. Exports of Italian automatic machine tools likewise increased in the period from 1928 to 1929, from 55 tons, worth $36,862, to 71 tons, valued at $31,379. In 1930 a slight drop in exports, to 67 tons, at a value of $26,655, was recorded.

Italy's machine tool exports chiefly extend to the Mediterranean countries and to Great Britain, Brazil and Chile. The totals for the years 1928 to 1930, and destinations of those exports, are specified as follows by the Italian Chamber of Commerce:

	1930	1929	1928
	Tons		
France	115	84	124
Great Britain	34	76	34
Tripolis	29	31	59
Spain	11	37	14
Egypt	19	1	1
Italian Somaliland	5	15	3
Switzerland	4	3	18
Greece	4	2	7
Belgium	....	....	11
Brasil	2	49	4
Chile	4	....	1
Other countries	340	292	123
Totaling	567	590	399

The Outlook for 1932

By Gerard Swope,
President, General Electric Co.

The electrical industry is in a peculiarly fortunate position, for even in the past year there has been an increased consumption of electricity in the homes, mainly because of the installation of a greater variety of electrical appliances. In this year, also industrial companies have modernized their productive methods, requiring new applications of electricity.

The Pennsylvania Railroad has embarked on a great program of electrification and this undoubtedly will be followed by others, where density of traffic, the convenience of the traveling public and economic considerations show that a change to electric operation is advantageous.

Because these things have been true in such a poor year as 1931, we look forward to 1932 and the succeeding years with confidence. We think that conditions in our country in 1932 should be at least as good as in 1931, after which we can look forward to a gradual increase in the electrical manufacturing business.

German Industry Expands Its Markets

BY OUR BERLIN CORRESPONDENT

A short time ago the "Committee for the Translation of German Standards and Conditions of Delivery" was founded in Germany, which aims, with the assistance of competent authorities, to induce German industry to translate its standards and conditions of delivery required in exports into foreign languages. In this way foreigners, particularly South Americans, English-speaking foreigners and those of Latin race are to be enabled to study the quality of German products in their own languages.

The first tasks of the German translation committee refer to Electrical Engineering and comprise the regulations issued by the VDE (Association of German Electrical Engineers) concerning electrical equipment and machines, transformers, covered and insulated wires and cables, and insulated and lead-covered cables for high tension installations. These regulations have already been published in English, French, Spanish and Portuguese, systematic propaganda being effected with their aid not only by manufacturers but also by Germany's official foreign representations.

This committee's activity is, however, not confined to Electrical Engineering; the following associations are also represented in it: Committee of Locomotive Standards, German Engine-Building Association, the combined firms of the metal, mining and milling industries, the Association of German machine constructors, etc. All these organizations are busy preparing translations of their standards and regulations into foreign languages, as far as they are required in exports, a manner of advertising motivated by the correct psychological consideration of simplified supply of spares; i.e., good "service."

Tapping Demonstration Draws Engineers

About 300 engineers and manufacturers in the Chicago area visited the tapping demonstration on the new high-speed tapping equipment developed by the R. G. Haskins Co. (*AM*—Vol. 75, page 938). Local manufacturers had sent in typical parts to be tapped, and altogether there were 24 machines set up threading various materials, including die-cast aluminum, brass, cold-rolled steel, zinc-base die castings and cast iron, at exceptionally high productive tapping speeds.

Canadian Tariffs Halve U. S. Machine Imports

Ottawa, Ont.—Some indication of how the Imperial trade movement and higher Canadian tariffs are effecting machinery exports from the United States to the Dominion, is given in a recent review by the Dominion Bureau of Statistics. Imports of machinery from Great Britain in the two years ending September, 1931, had a value of $3,700,000 in each of the two years, whereas imports of machinery from the United States fell from $53,000,000 in 1930 to $29,000,000 in 1931.

Under this general heading, however, it is noteworthy that Canada's imports of textile machinery from Great Britain increased from $528,000 to $910,000 at a time when imports of this item from the United States fell off from $4,300,000 to $3,084,000. In most items where there has been a change in ratio, it is like that shown for mining machinery where the total imports from Great Britain fell off from $550,000 to $464,000 as against a fall in imports from the United States of $8,000,000 to $3,100,000. the value of rolling mill products imported from Great Britain fell off by one-seventh, while the value of the rolling mill products imported from the United States fell off by one-third.

Chamber of Commerce Sets Up Business Plan

Organized business, as represented in the Chamber of Commerce of the United States has made public a national program containing proposals for business and employment stabilization. These deal with long-range problems and with the immediate situation.

The national program proposes four main recommendations to promote economic stability, namely:

The setting up by business itself of a national economic council to aid all fields of industry, finance and commerce in their planning.

Modification of the anti-trust law to make clear lawfulness of agreements intended to relate production to consumption. Relief in emergencies for the natural resource industries, such as coal, oil and lumber, by the creation of a government tribunal which would permit agreements for curtailment of production when in the public interest. Establishment of privately sustained systems of unemployment benefits as well as other similar benefits based upon definite reserves previously established.

The National Chamber's program was formulated as a result of a vote of its membership on 11 recommendations.

Hoover Offers Further Help

President Hoover, who recently donated $5,000 to the Professional Engineers Committee on Unemployment, has expressed his willingness to be of further help to the Committee in its relief activities. Acknowledging a letter from H. DE B. PARSONS, general chairman, expressing the thanks of the engineers for his assistance, Mr. Hoover replied:

"It was very kind of you to write your letter of Dec. 10. I am indeed glad to be of help, and will be glad to be of further help in any other way you may suggest."

The Committee was recently organized by the New York sections of the four national engineering societies, and is now soliciting funds among members of the societies. Members are also being asked to help find jobs for unemployed engineers.

Lukens Steel Founds Industrial Fellowship

DR. EDWARD R. WEIDLEIN, director Mellon Institute of Industrial Research, Pittsburgh, Pa., has announced that the Lukens Steel Co., Coatesville, Pa., has established in the Institute an Industrial Fellowship whose purpose is the scientific investigation of processes employed in the manufacture of steel plates. ERLE G. HILL, who received his professional education at the University of California, has been appointed to the incumbency of this fellowship. He is a specialist in iron and steel technology who was previously associate professor of metallurgy in the School of Mines, University of Pittsburgh.

Materials Handlers Meet Again May 2-6

The object of the Materials Handling Institute, formation of which has been announced in two previous issues of *American Machinist,* is primarily educational to promote a more intense mechanical handling consciousness in the minds of industrial executives, also to promote better understanding of the relationship in a cooperative way between the various groups. The group of governors, whose election was announced last week, have been given authority to add to their number as they see fit after making a study of the industry groups in more detail. The Board of Governors and officers were given power to choose various committees, including constitutional and by-laws committee, publicity, educational, etc. The next meeting of the group will be held the week of May 2nd to 6th during the American Foundrymen's Association meeting in Philadelphia.

BUSINESS ITEMS

Detroit Gear & Machine Co., division of the Borg-Warner Corp., reports that all of its standard parts contracts with large automobile companies have been renewed for 1932. The company is introducing three new free-wheeling units and a new transmission.

The Indiana Steel & Wire Co., Muncie, Ind., is erecting a new 59x 236-ft. warehouse. It will be of brick, steel and concrete construction and will be completed as rapidly as possible.

The Superior Steel Products Co., 325 West McKinley Ave., Milwaukee, Wis., formerly the Superior Tool & Die Co., is now in quantity production on a new type of die set fabricated from steel plate and having welded shanks and flanges instead of being cast in gray iron. The plant is working six days a week, and some extra on Sundays. KASIMIR JANISZEWSKI is manager.

Riehle Bros. Testing Machine Co., 1424 No. 9th St., Philadelphia, Pa., has been appointed special distributor for the United States, British Columbia, Alaska, Hawaii, and the Philippine Islands for the Spekker steeloscope of Adam Hilger, Ltd., astronomical and optical instrument maker of 24 Rochester Place, London, N.W., England. The steeloscope is a specialized spectroscope for the rapid estimation of metallic elements in steels.

Approximately 1,200 men have returned to work in December at the North Little Rock (Ark.) shops of the Missouri Pacific R.R. W. H. MCAMES, superintendent, said that virtually all workers were put back in the shop. Full crews will be employed by Jan. 1.

The Mechanical Refrigeration Industry has sold more than 1,000,000 units during 1931, as compared with 775,000 in 1930, and 660,000 in 1929. November sales of Norge refrigerators were 212 per cent of the volume for November last year, and for 11 months the increase is 462 per cent. December is so far ahead that the corporation is assured of having 12 consecutive months of sales increases. Sales of Frigidaires in New York City during November exceeded by 61 per cent the November, 1930, figures.

Lycoming Mfg. Co., Williamsport, Pa., has added approximately 1,000 employees within the last 10 days, 55 per cent in the foundry division and the remainder in the machine shops and assembly departments. Orders on hand average nearly 20 per cent ahead of last year. Practically all departments are working a full 6-day week, with night shifts in some departments.

Motor Wheel Corp. has added 300 men to its working force and is operating departments of its pressed steel division on a 24-hour basis.

Studebaker Corp. is continuing its expansion of employment in the South Bend plant and at present 9,000 men are employed on a nine-hour basis.

Gearench Mfg. Co., Houston, Tex., C. E. OLSON, general manager, 313-323 Hughes St., has added the new metal welding tong to its extensive line. The company started with a patented monkey-wrench and has now evolved a complete line of wrenches and tongs of various types.

Edward G. Budd Mfg. Co., Philadelphia, will have a January payroll of $800,000 and nearly twice that of January, 1931.

Eclipse Machine Co., Elmira, N. Y., division of Bendix Aviation Corp., soon will be running at capacity with 300 additional workmen employed.

Bureau of Labor Statistics reports that the large increase in hiring for November in the automotive industry is the largest increase in the hiring rate shown in that industry for any month either in 1930 or 1931.

A complete set-up of machinery for manufacturing large-diameter steel pipe by the Electronic Tornado process of automatic welding in a shielded arc has just been ordered by the Asano Dockyard Co., of Japan, from The Lincoln Electric Co., Cleveland, Ohio. Installation of the machinery will be supervised by T. Y. INAGAKY, Tokio representative of Lincoln.

Auburn Automobile Co. has let orders in excess of $11,000,000 during the last two weeks for materials for first-quarter production. More than 100 companies share in the orders. Auburn turned its inventory 18 times during 1931.

Axelson Mfg. Co., Ltd., Los Angeles, has moved from 6160 Boyle Ave., to P. O. Box 710, Vernon Station.

Stockholders of Triplex Safety Glass Co. of North America are to be submitted a proposal for the sale of the flat glass and laminated glass business and all land, buildings, machinery and patents of the company to Libbey-Owens-Ford Glass Co. Triplex, according to the plan, will retain its cash and other liquid assets, aside from certain inventories that will be purchased by Libbey-Owens-Ford. The deal must be approved by two-thirds of the Triplex preferred stockholders and a majority of the common stockholders to become effective.

Chief Triplex plants are at Clifton, N. J. Libbey-Owens-Ford will sell the Clifton plants to the Pittsburgh Plate Glass Co., which will be licensed to make glass under the Triplex patents.

The Mueller Brass Co., Port Huron, Mich., reports an increase of 296 per cent in sales of streamline copper pipe and fittings for the fiscal year ending Nov. 28, 1931, as compared with the preceding year. For the 13 periods just ending sales totaled $448,555.32, in spite of the decline in the building market and in copper prices.

The address of the Survey of Current Business has been changed to Survey of Current Business, (15-g), Bureau of Foreign & Domestic Commerce, Department of Commerce, Washington, D. C.

Stinson Aircraft Corp., Wayne, Mich., division of the Cord Corp., has made material commitments totalling more than $2,500,000 within the last ten days. Current expansion and revamping of plant equipment is being completed. Further expansion is contemplated in erection of new research and experimental laboratories. Capacity production will begin Jan. 1 with the addition of 300 workmen.

Ortmeier Machinery Co., 1420 Williams St., Chattanooga, Tenn., has equipped a new forge shop with power hammer for doing light and heavy forging, making of forged tools for machine work, stone and brick masons, contractors and mill supply trade. W. E. MASHBURN is in charge of this added department.

PERSONALS

W. J. FREEMAN, works superintendent of the Port Colborne (Ont.) works, International Nickel Co., will retire Jan. 1 after more than 43 years of service with the company.

C. A. ANDERSON has been appointed general manager of Wright Mfg. Co., Bridgeport, Conn. R. C. BLAIR is appointed assistant sales manager, with headquarters at York, Pa.

PROF. ERNEST BROWN, formerly professor of mechanics and hydraulics at McGill University, Montreal, has been appointed dean of the Faculty of Engineering at McGill. Professor Brown has been for some time connected with the Shawinigan Water and Power Co. on hydraulic work. He is a member of the Engineering Institute of Canada.

FRED W. BUSCHE has been named vice-president and sales manager of the Iroquois Foundry Co., Racine, Wis. He was vice-president of the Prime Mfg. Co., Milwaukee, in direct charge of its foundry division for more than ten years. With the appointment of Mr. Busche, the Iroquois Foundry Co. is installing a brass and aluminum division, which will be directly under his supervision.

PAUL R. CLARK, formerly president of the Fireproof Products Co., and district manager for Genfire Steel Co., at New York City, has been appointed manager of the New York branch, Consolidated Expanded Metal Co., Wheeling, W. Va.

EVERETT S. LEE, an assistant engineer of the General Engineering Laboratory General Electric Co., has been appointed engineer of the laboratory to succeed the late LOUIS T. ROBINSON.

PROF. A. B. LAMB of Harvard University has been elected president of the American Chemical Society for 1933. The president for 1932 is DR. L. V. REDMAN, vice-president and director of research of the Bakelite Corp., Bloomfield, N. J., who succeeds PROF. MOSES GOMBERG of the University of Michigan, Jan. 1.

L. S. Horner
Appointed a Bullard vice-president

George E. Griffin, traffic manager of the Carborundum Co., has been elected a director of the Transportation Club, Buffalo, N. Y.

C. Lewis Hull, sales manager, Switch & Panel division, Square D Co., Detroit, Mich., announces the appointment of C. W. Bates, formerly Chicago branch manager, as assistant sales manager. G. S. Blomgren, of the Chicago office, succeeds Mr. Bates as Chicago branch manager. Mr. Bates' headquarters will be at the Detroit factory.

Carl J. Lamb has been appointed New York district manager for the Sharples Specialty Co., centrifugal engineers, 23rd & Westmoreland Sts., Philadelphia, Pa. Mr. Lamb, a former naval officer, has been in the service, engineering and sales departments of the Westinghouse Electric & Mfg. Co., until his recent resignation. Previous to his connection with Westinghouse, he was in engineering work with the E. I. duPont de Nemours Co. and the Sinclair Consolidated Oil Co.

C. J. McCaffrey, Fort Wayne, Ind., formerly assistant division manager of the S. F. Bowser & Co., Albany, N. Y., has taken a position with the Ward Hydraulic Hoist & Body Co., a division of Gar Wood Industries, Detroit, Mich. He will do field work for the company.

Carl A. Peterson, formerly designing engineer for the Atwood-Bradshaw Corp., Pittsburgh, has been made chief engineer and a director.

Ram Nath Puri, manager of the India America Trade Developer Co., Robert Dollar Bldg., San Francisco, Calif., is to lead an American trade touring exhibit to India, Burma and Ceylon in the interests of American manufacturers, fruit shippers and exporters for trade development and expansion. Contrary to general impression, India is the fifth industrial nation of the world, surpassed only in volume and value by the United States, Great Britain, Germany and France. The average daily number of persons employed in the 8,625 factories there is 1,689,690.

George J. Schopf and William J. Glastetter have been added to the board of directors of the Anchor Ship & Boiler Repair Co., Buffalo, N. Y.

Case E. Selden, formerly vice-president of the Ainsworth Mfg. Co., will join the Edward G. Budd Mfg. Co., Philadelphia, and the Budd Wheel Co., Jan. 1.

H. S. Snodgrass has been appointed vice-president of the American-La France & Foamite Corp., Elmira, N. Y., in charge of all manufacturing operations. He joined the company in 1927 as purchasing agent, and later became production manager. He has also been purchasing agent of the Moline Plow Co., and Fageol Motors Co., and superintendent of production of American Car & Foundry Motors Co.

Frank J. Thrall has joined the sales division of the Marks Perry Steel Corp., Detroit.

John T. Whiting, general manager of the Hamilton Coke & Iron Co., for the past four years, has resigned to join the Allen Wood Steel Co., Philadelphia, as of Jan. 1.

OBITUARIES

John W. Dorsey, 62, safety engineer for the Solvay Process Co., Syracuse, N. Y., died of a heart attack, Dec. 16.

Wade Hampton Luckett, 57, connected as sales manager and in other capacities with the Hersey Meter Co., Boston, Mass., for the last 27 years, died recently after an illness of four years.

R. Bigelow Lockwood, 49, advertising counselor for the Atlantic District sales office of the McGraw-Hill Publishing Co., and known throughout the country as the author of text books on industrial advertising and marketing, died suddenly Dec. 21. He joined McGraw-Hill in 1907.

Charles N. Kalk, 70, veteran railroad engineering executive, associated with the engineering department of the former Wisconsin Central railroad, died in Seattle, Dec. 10. He had been a chief engineer of the Wisconsin Central with headquarters in Milwaukee. When it became a part of the Minneapolis, St. Paul & Ste. Marie, he was then transferred to Chicago and later became chief engineer of the line. He retired about eight years ago.

Dr. Charles Herschel Koyl, 76, widely known for his scientific work in the railway field, died of pneumonia Dec. 18, in Chicago. He had been engineer in charge of water treatment for the Milwaukee Railroad since 1920, was the originator of methods of water treatment for locomotive use, and was also the inventor of a number of railroad signal devices.

Thomas Nott, 45, president of the Nott Heater Co., Cincinnati, died there Dec. 23.

Frederick W. J. McKibben, 56, president of the Tompkins Bros. Co., knitting machinery manufacturers of Syracuse, N. Y., died Dec. 23 of heart disease.

George Milne, plant superintendent of the Cleveland (Tenn.) Chair Co., was almost instantly killed Dec. 16, when he fell while working on a sample chair and struck his head on a lathe. The blow resulted in concussion of the brain.

Frank B. Robinson, 78, formerly president of the Carbon Steel Co., Pittsburgh, Pa., died recently in New York City. He reorganized and became president of the Carbon Steel Co. in 1907, and retired in 1910, to be succeeded by Charles McKnight. He retained a large stock interest and remained a director until 1914.

J. William Schatz, 56, president of the Federal Bearings Co., vice-president of the Schatz Mfg. Co., and of the Waterbury Steel Ball Co., Waterbury, Conn., was killed Dec. 20, at Poughkeepsie, N. Y., by his Japanese butler.

Peter A. Slattery, 68, director and treasurer of J. B. Slattery & Co., Brooklyn, N. Y., manufacturer of gas ranges, died Dec. 14, in Brooklyn.

Dr. James S. Swartz 91, former treasurer of the International Mercantile Marine Co., New York City, died Dec. 15, there.

John Woltman, 72, a department superintendent of the American Gas Furnace Co., Elizabeth, N. J., for more than 30 years, died Dec. 21, after a brief illness.

MEETINGS

National Automobile Show
New York, Grand Central Palace, Jan. 9-16; Chicago, Coliseum, Jan. 30-Feb. 6.

Steel Founder's Society of America, Inc.
Annual meeting, Chicago, Ill.. Jan. 21, 1932. G. P. Rogers, managing director, 932 Graybar Bldg., New York City.

National Association of Engine & Boat Manufacturers
Motorboat and marine engine show, Grand Central Palace, New York City, Jan. 22-30, 1932. Henry R. Sutphen, president.

Society of Automotive Engineers
Annual meeting, Book-Cadillac Hotel, Detroit, Mich., Jan. 25-29. John A. C. Warner, secretary, 29 West 39th St., New York, N. Y.

American Institute of Electrical Engineers
Annual Winter meeting, Engineering Societies Bldg., New York, N. Y., Jan. 25-29. F. L. Hutchinson, secretary, 33 West 39th St., New York City.

Second International Heating & Ventilating Exposition
Sponsored by American Society of Heating & Ventilating Engineers, in conjunction with A.S.R.E., American Oil Burner Ass'n, and National Warm Air Heating Ass'n. Cleveland Auditorium, Cleveland, Ohio, Jan. 25-29.

American Management Association
Packaging, packing and shipping exposition Palmer House, Chicago, Ill., Mar. 7-12, 1932. W. J. Donald, managing director, Room 602, 225 West 64th St., New York, N. Y.

Foundry and Industrial Exposition
Also 36th annual convention, American Foundrymen's Ass'n. New Municipal Auditorium, May 2-6. C. E. Hoyt, manager, American Foundrymen's Ass'n., Inc., 222 W. Adams St., Chicago.

MACHINE REQUIREMENTS AND INDUSTRIAL CONSTRUCTION

Opportunities for Future Business

Ala., North Birmingham—Ingalls Iron Works Co., 720 4th Ave. S., Birmingham, plans construction of additional facilities to drum manufacturng plant here.

Calif., Kernville—American Smelting & Refining Co., 120 Broadway, New York, N. Y., plans gold mine development and exploration including building, machinery and equipment here. Estimated cost to exceed $100,000.

Calif., Long Beach — City will soon receive bids for construction of a 3 story, 60 x 120 ft. public utility building, including garage at Broadway and Pacific Ave. Estimated cost $90,000. Dedrick & Bobbe, 901 Hartwell Bldg., Archts. Noted December 24.

Conn., New Haven—Auto Electric Sales & Service Co. Inc., 267 Park St., awarded contract for construction 1 story service station at Goffe and Sperry Sts. Estimated cost $40,000. Noted December 10.

Ind., Indianapolis—Indian Refining Co., 38th St. and Central Ave., awarded contract for construction of a service station. Estimated cost $50,000.

Ind., Lafayette—Purdue University, West Lafayette, having plans prepared for construction of a 3 story, 60 x 230 ft. mechanical engineering building on campus. Estimated cost $200,000. Walter Scholer, 210 Wallace Bldg., Lafayette, Archt.

Kan., Kansas City—L. O. Cunningham, 729 Nebraska Ave., will soon award contract for a 2 story, 50 x 105 ft. garage at State Ave. and Allis Alley. Peterson & Almon, 509 Huron Bldg., Archts.

Me., Biddeford—Saco-Lowell Shops, manufacturers of textile machinery, plans to consolidate plant at Newton Upper Falls, Mass., with Biddeford plant and will make alterations and extensions. Estimated cost approximately $500,000. Work will probably be done by day labor.

Mass., Chicopee—Palmer Steel Co. Inc., 1694 Main St., Springfield, plans construction of two 2 story factory buildings on McKinstry Ave. here. Estimated cost $40,000. Private plans.

Mass., Danvers — Lyons Bros. Garage Inc., High St., will build a 1 story service garage. Estimated cost $40,000. Sanborn & Weed, 38 Exchange St., Lynn, Archts. Work will be done by separate contracts.

Mass., Salem—Mexican Petroleum Corp., J. D. Bartlett, 182 Crown St., New Haven, Conn., plans construction of oil terminal and distribution plant at Ocean Ave. and Broadway here. Estimated cost to exceed $40,000. Private plans.

Mo., Carthage—Standard Machine Mfg. Co., plans to rebuild plant destroyed by fire. Loss $30,000.

Mo., St. Louis—Board of Public Service, 208 City Hall, will receive bids in Spring for construction of first unit of Negro city hospital group including service building, boiler house, laundry building, etc., at Goode, St. Kennerly and Whittier Sts. Estimated cost $350,000. A. Osburg, 301 City Hall, Archt. and L. R. Bowen, 301 City Hall, Engr. Noted September 10.

N. J., Little Falls—Little Falls Laundry Co., Main St., having revised plans prepared for a 2 story, 140 x 280 ft. garage and laundry building on Main St. Estimated cost $150,000. F. W. Wentworth, 140 Market St., Paterson, Archt. Former bids rejected. Noted December 10.

N. J., Nutley — George Swan & Co., 500 Kingsland Road, manufacturers of water heaters and tubing, plans construction of 80 x 300 ft. factory. Estimated cost $40,000.

N. Y., New York—Board of Education, 500 Park Ave., plans construction of a high school including manual training department at Boynton Ave. and East 172nd St. Estimated cost $2,000,000.

N. Y., Lackawanna—Spring Perch Co., Stratford, Conn., awarded contract for construction of two factory buildings each 2 story, 165 x 250 and 60 x 200 ft. for the manufacture of automobile springs at Hamburg Turnpike here. Estimated cost $150,000.

N. Y., Napanoch—Commissioner of Correction, State Office Bldg., Albany, will receive bids until January 5 for construction of a group of buildings including industrial shop, storehouse, etc., at Institution for Defective Delinquents, here.

N. Y., New York—John Bradley, Inc., 19 Beach St. plans construction of a service garage at 555 Greenwich St. Estimated cost to exceed $40,000.

N. Y., New York—Consolidated Laundries, 122 East 42nd St., awarded contract for construction of a laundry building and garage. Estimated cost $50,000.

N. Y., Woodside—R. Stonel, 39-33 Queens Blvd., Long Island City, plans construction of a 111 x 222 ft. service garage and gas station at Queens Blvd. and 51st St. Estimated cost $40,000. Project pending granting of permit. Maturity about July. Noted December 10.

O., Cleveland—William A. Howe Co., E. W. Reutner, Pres. and Treas., 2630 Payne Ave., manufacturers of mountings for lithographs, plans construction of a 2 story factory on East 27th St. Estimaed cost $50,000. Architect not announced.

Pa., Philadelphia — Philadelphia Savings Fund Society, 12th and Market Sts., awarded contract for construction of a 3 story service garage and repair shop. Estimated cost $250,000.

Pa., Washington — R. Garey Dickson, 6028 Center Ave., Pittsburgh, Archt., receiving preliminary estimates for construction of a 1 story, 70 x 120 ft. garage on South Main St. for Washington Hotel Co., J. E. Lindsey, Mgr.

Tex., Alamo—Rio Grande Valley Sportsmans Club, c/o E. R. Redlich, Pres., having preliminary plans prepared for 2 story, 160 x 240 ft. country club building including auto repair shop, etc., near here. Estimated cost $150,000. Roger H. Bullard, 607 5th Ave., New York, Archt. L. H. Armstrong, c/o owner, Engr.

Tex., San Antonio — Board of Eduction, Lavaca and Water Sts., will soon receive bids for construction of a junior high school including manual training department, etc., at Huisache and Mulberry Sts., Lake Blvd. and Rampmann Blvd. Estimated cost $300,000. Phelps & DeWees, 619 Gunter Bldg., and Atlee B. and Robert M. Ayres, Smith-Young Tower, and Robert B. Kelly, Milam Bldg., Assoc. Archts. James W. Simpson, Milam Bldg., Engr. Noted September 24.

Vt., Proctor—Vermont Marble Co., awarded contract for construction of a 1 story marble finishing plant. Estimated cost $50,000.

Wis., Manitowoc—County of Manitowoc, c/o Edward Berkedal, Comr., preparing plans for a 1 story, 70 x 300 ft. repair shop. Estimated cost $40,000. Smith & Brandt, Odd Fellows Bldg., Appleton, Archts.

Wis., Wausau—Bluhm Auto & Cab Co., 310 Washington St., awarded contract for construction of a 1 story, 60 x 62 ft. repair and service garage. Estimated cost $15,000.

Ont., Hamilton—Shell Co. of Canada, Ltd., Federal Bldg., Toronto, plans construction of an oil and gasoline distribution plant at Ottawa and Burlington Sts. here. First units will include 950,000 gal. storage tank, loading warehouse and garage. Estimated cost $50,000. Private plans.

Ont., Kirkland Lake — Lake Shore Mines Ltd., will build a 1 to 3 story addition to gold mining plant here. Estimated cost $250,000. Private plans. Work will be done by day labor.

Ont., Toronto—City will soon receive bids for exensions to garage and repair shop. $65,000. J. J. Woolnaugh, City Hall, Archt.

T. H., Pearl Harbor—Bureau of Yards & Docks, Navy Dept., Washington, D. C., will receive bids until February 3 for construction of building for engine and aircraft overhaul shop at Naval Operating Base, Air Station here. Noted December 3.

Equipment Wanted

Calif., Mare Island (sta. Vallejo)—Bureau of Supplies & Accounts, Navy Dept., Washington, D. C.—will receive bids until January 5 for grinding machine and universal grinder both motor drven for Navy Yard here. Scheds. 7111 and 7122.

D. C., Washington — Bureau of Supplies & Accounts, Navy Dept.—will receive bids until January 5 for six motor driven selective head engine lathes for Navy Yard, New York, and San Francisco, Calif. Sched. 7076.

Mass., Boston—Bureau of Supplies & Accounts, Navy Dept., Washington, D. C.—will receive bids until January 5 for motor driven screw cutting engine lathe for Navy Yard here. Sched. 7121.

N. H., Portsmouth—Bureau of Supplies & Accounts, Navy Dept., Washington, D. C.—will receive bids until January 5 for motor driven milling machine for Navy Yard here.

N. J., Newark — B. E. Jarvis Inc., 113 Mechanic St. (manufacturers of metal patterns, etc.)—additional equipment for recently acquired building at 74 Malven St.

N. Y., Brooklyn—Bureau of Supplies & Accounts, Navy Dept., Washington, D. C.—will receive bids until January 5 for two hacksaw machines and single surfacer planer, both motor driven for Navy Yard here. Scheds. 7123 and 7096.

N. Y., Long Island—R. W. Rodman, Supt. of Plant Operation, Board of Education, 131 Livingston St., Brooklyn—will receive bids until January for furnishing and installing shop equipment, etc., in Bryant high school, Wilbur Ave. and Academy St. here.

N. Y., White Plains—E. F. Keating Co. Pipe Bending & Supply Co., 452 Water St., New York—small shop equipment for plant here. $120,000.

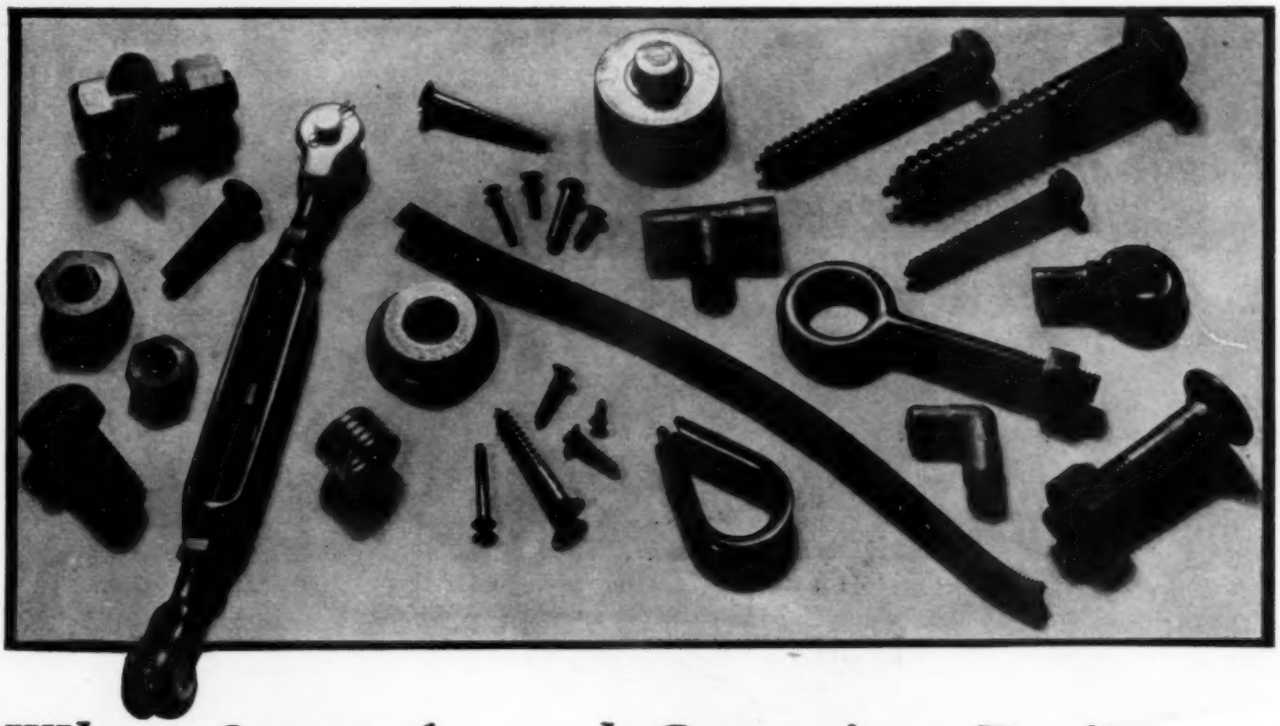
O., Dayton—Air Corps, Contracting Officers, Wright Field—will receive bids until January 11 for five patternmaker's lathes, wood shapers, sanders, variety saws, band saws, cut-off saw, surfacer, knife grinders, boring machines, sharpener and gummer, planers and jointers, all motor driven.

Pa., Philadelphia—Bureau of Supplies & Accounts, Navy Dept., Washington, D. C.—will receive bids until January 5 for one motor driven hack saw for Navy Yard here. Sched. 7101.

Va., Hampton Roads (br. Norfolk)—Bureau of Supplies & Accounts, Navy Dept., Washington, D. C.—will receive bids until January 5 for three motor driven geared head engine lathes for Navy Yard here. Sched. 7093.

Wash., Puget Sound—Bureau of Supplies & Accounts, Navy Dept., Washington, D. C.—will receive bids until January 5 for two motor driven lathes for Navy Yard here. Sched. 7100.

Ont., Hamilton — Trupar Manufacturing Co., 116 Davis Ave., Dayton, O.—machinery and equipment for the manufacture of electric refrigerators and refrigerator bodies for motor trucks in connection with recently acquired building here.



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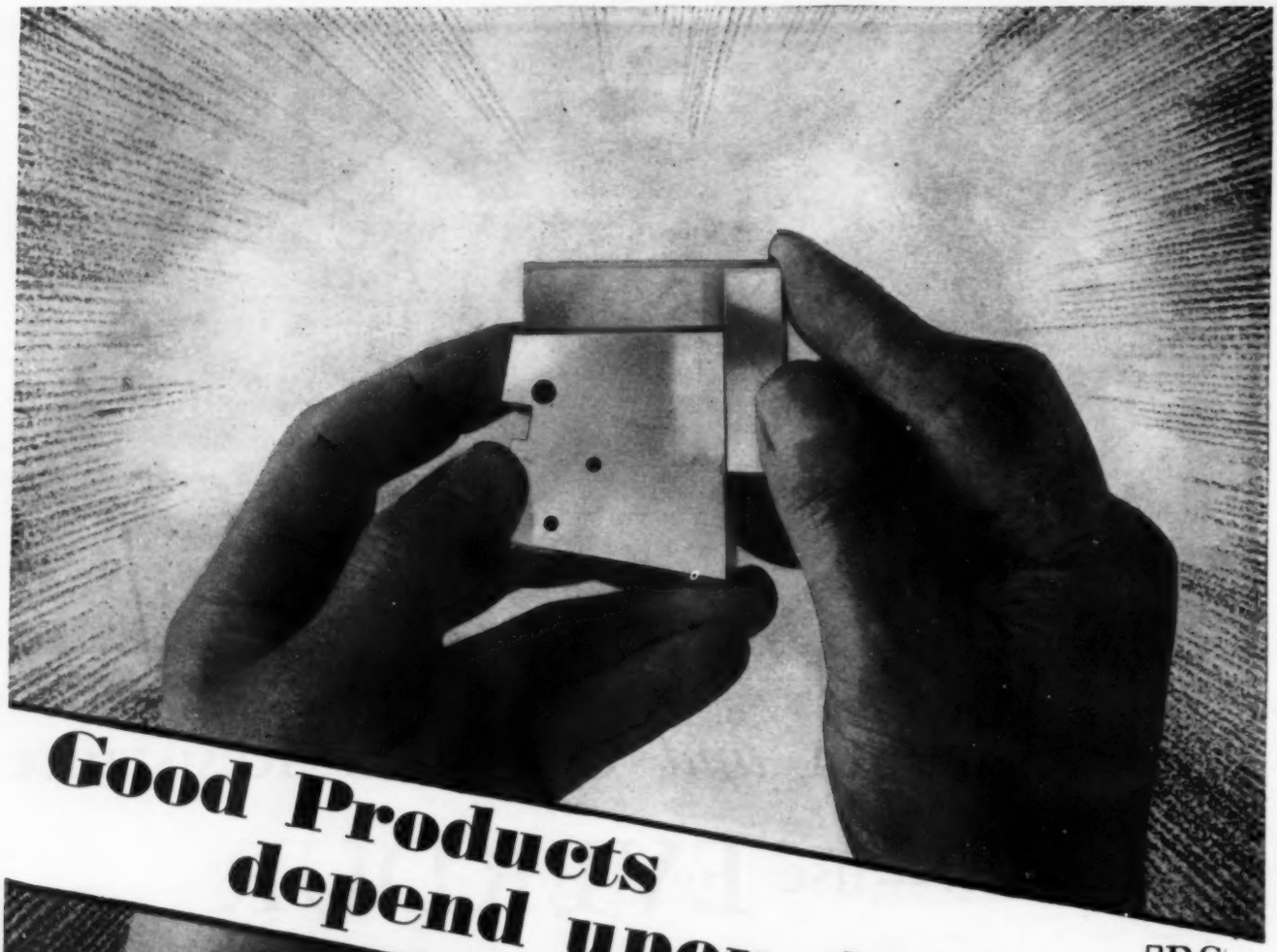

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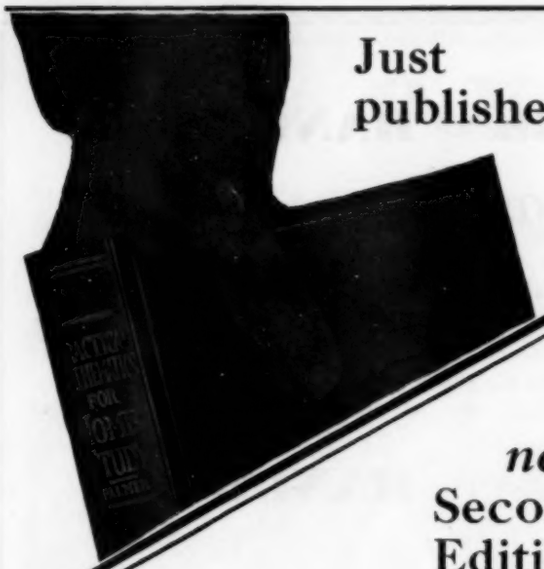

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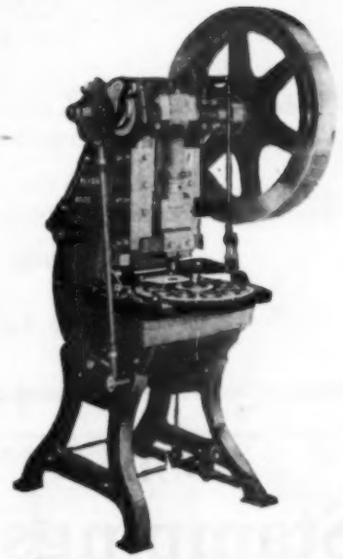

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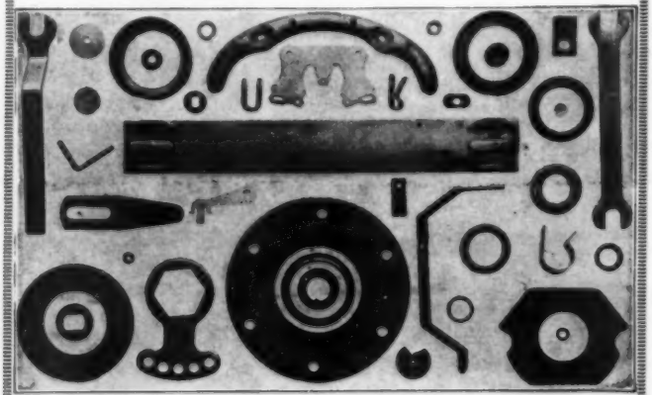

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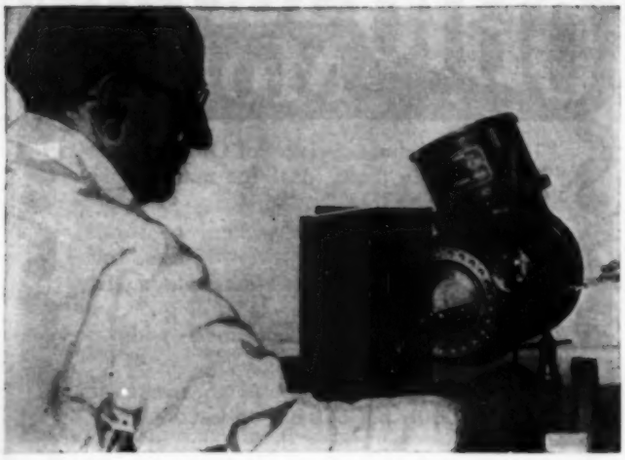

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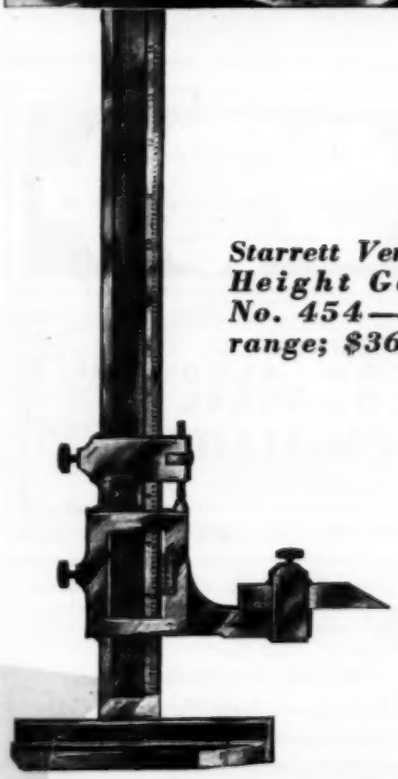

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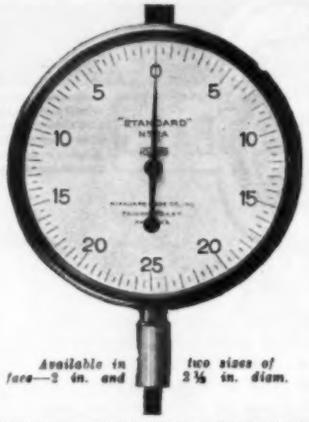
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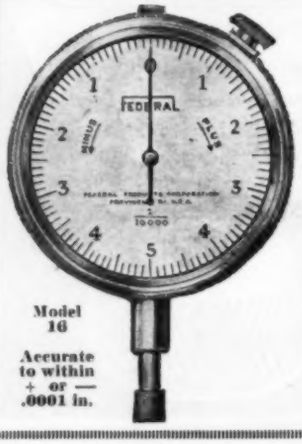
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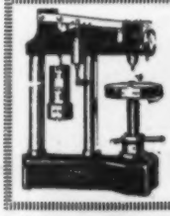

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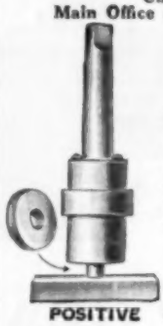

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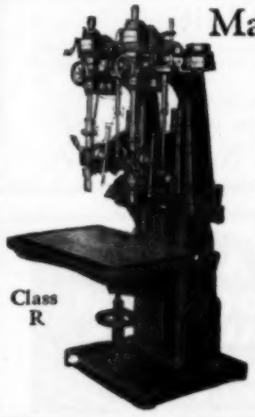

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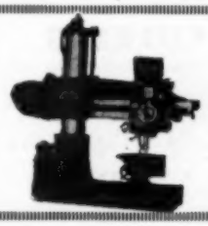

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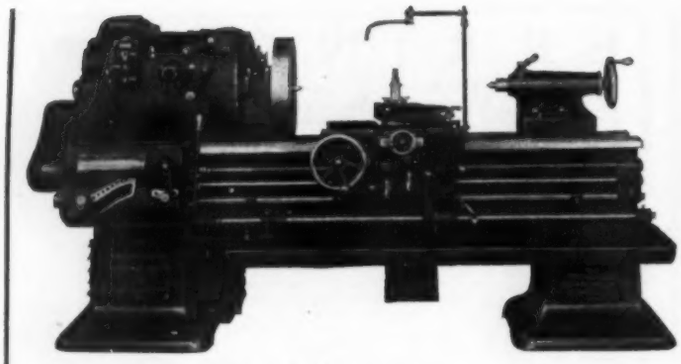

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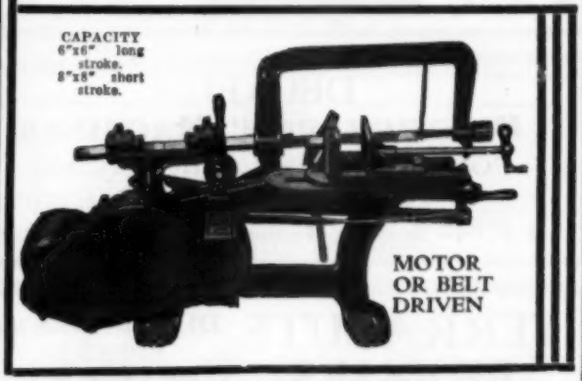

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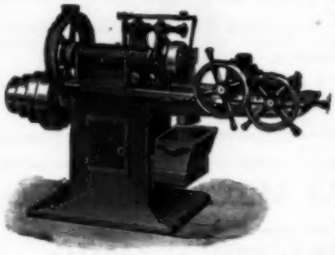

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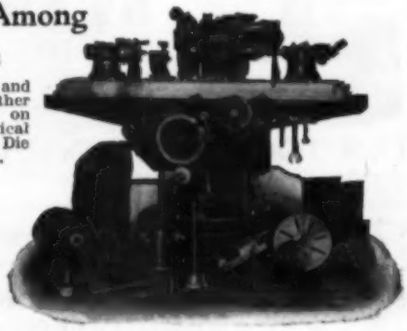

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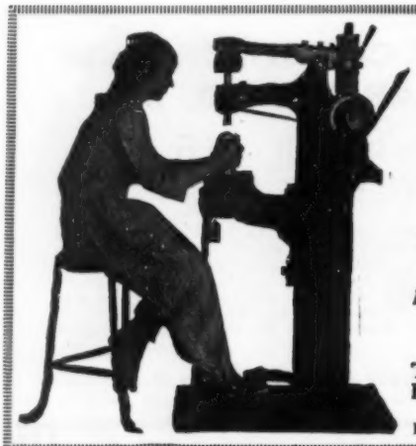

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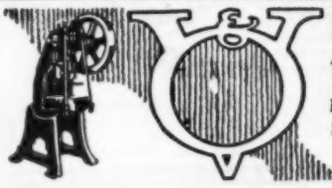

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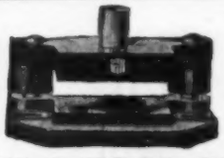

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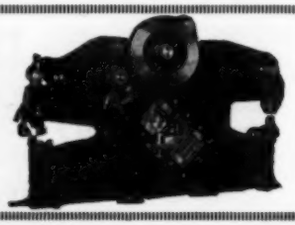

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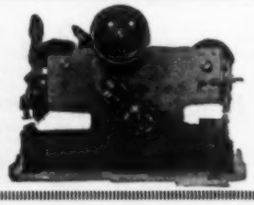

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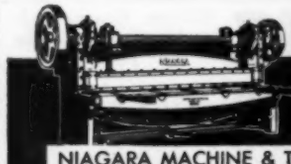

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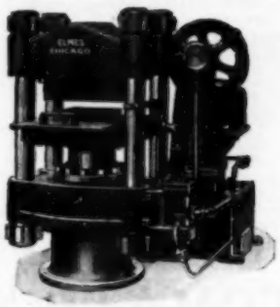

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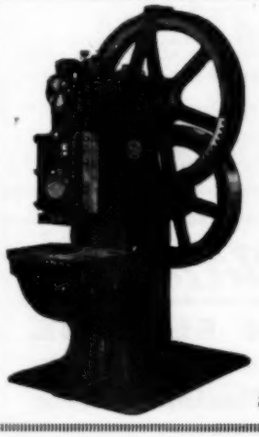

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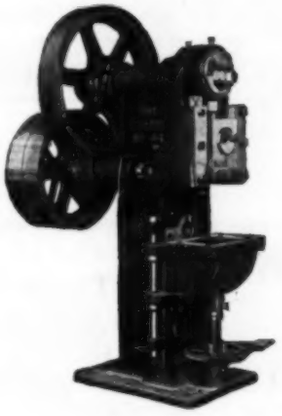

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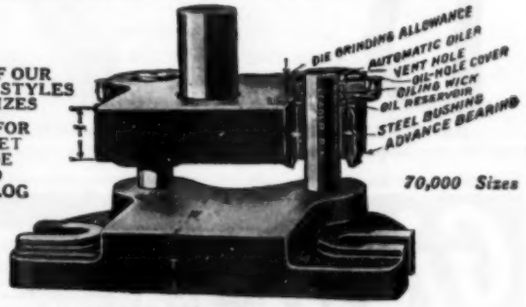

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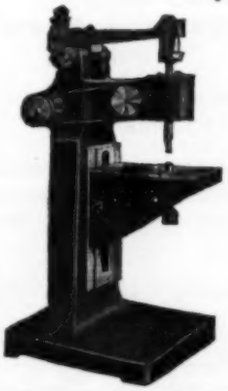

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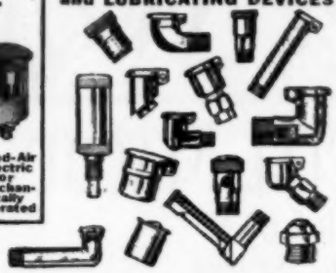

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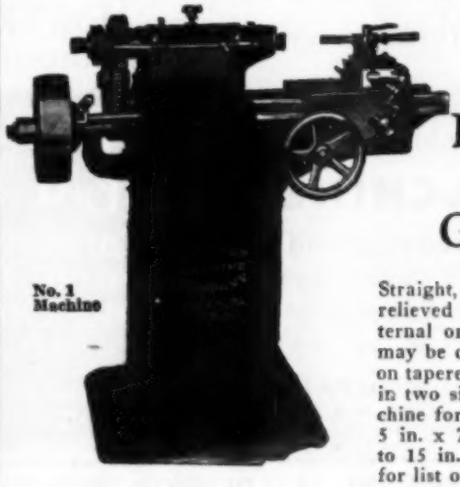

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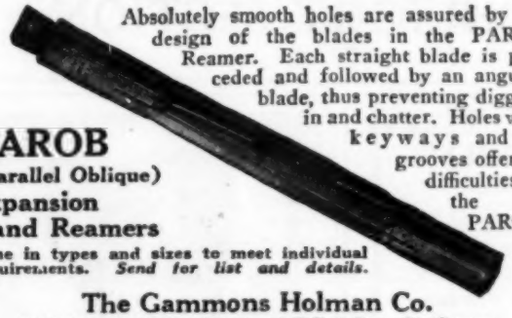

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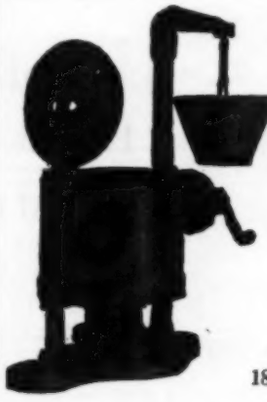

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Watson-Stillman Co.

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Morse Twist Drill & Mch. Co.
Sundstrand Mach. Tool Co.
Whitman & Barnes, Inc.

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New Departure Mfg. Co.

BARRELS, Burnishing and Tumbling
Hartford (Conn.) Steel Ball Co

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New Departure Mfg. Co.
Torrington Co.

BEARINGS, Roller
Bantam Ball Bearing Co.
Timken Roller Bearing Co.

BEARINGS, Thrust
Cities Service Oil Co.
Timken Roller Bearing Co.

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Foote-Burt Co.
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National Acme Co.
National Machinery Co.

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Lovejoy Tool Co.

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Moline Tool Co.
Rockford Drilling Mach. Co.
Ryerson & Son, Jos. T.
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Starrett Co., L. S.

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Rowbottom Machine Co.

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Shore Instrument & Mfg. Co.

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Sundstrand Mach. Tool Co.

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Whitman & Barnes, Inc.

CENTERS, Planer
Detroit Alloy Steel Co.

CHAINS, Transmission
Boston Gear Wks., Sales Co.
Philadelphia Gear Works

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Noble & Westbrook Mfg. Co.

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Goss & De Leeuw Mach. Co.
Chas. L. Jarvis Co.
Jones & Lamson Mach. Co.
National Acme Co.
Potter & Johnson Mch. Co.

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Errington Mech. Laboratory
Geometric Tool Co.
National Tool Co.

CHUCKS, Collet
Sundstrand Mach. Tool Co.

CHUCKS, Drill and Tap
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Morse Twist Drill & Mch. Co.
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Errington Mech. Laboratory

CHUCKS, Grinding and Boring
City Mach. & Tool Wks.

CHUCKS, Magnetic
Heald Mach. Co.

CHUCKS, Split
Seneca Falls Machine Co.

CLAMPS, Machinists'
Starrett Co., L. S.

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Foote Bros. Gear & Machine Co.
Johnson Mach. Co.
Raybestos Manhattan, Inc.

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Detroit Stamping Co.

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Rivett Lathe & Grinder Corp

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COMPOUNDS, Cutting, Drawing, Drilling, Grinding
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Veeder-Root Hartford

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Cullman Wheel Co.
Foote Bros. Gear & Machine Co.
Philadelphia Gear Works
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Canton Fdry. & Machine Co.

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Morse Twist Drill & Mch. Co.
National Tool Co.

CUTTERS, Keyseater
Davis Keyseater Co.
Whitman & Barnes, Inc.

CUTTERS, Milling
Geometric Tool Co.
Illinois Tool Works
Lovejoy Tool Co., Inc.
Morse Twist Drill & Mch. Co.
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Emerman & Co., L. E.
Essley Mchy. Co., E. L.
Hyman & Sons, Jos.
Miles Machy. Co.
Morey & Co., Inc.
Osborne & Sexton Mchy. Co
Sonnenberg, Heinrich

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Gorton Mach. Co., Geo.
Oliver Instrument Co.

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U. S. Tool Co.

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U. S. Tool Co.

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Haskins Co., R. G.
Reed-Prentice Corp.

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Danly Mach. Specialties, Inc.
U. S. Tool Co.

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Errington Mech. Laboratory
Geometric Tool Co.
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Landis Tool Co.
Murchey Mach. & Tool Co.
National Acme Co.
National Machinery Co.

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DIES, Steel Marking
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Universal Drafting Machine Co.

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Universal Drafting Machine Co.

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Hoefer Mfg. Co.
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Rockford Drilling Mach. Co.
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Cincinnati Bickford Tool Co.
Foote-Burt Co.
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Rockford Drilling Mach. Co.

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U. S. Drill Head Co.

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Foote-Burt Co.
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Baker Bros. Toledo

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Sellers & Co., Wm.
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National Mchy. Co.

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Standard Gage Co., Inc.

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Sundstrand Mach. Tool Co.

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Sundstrand Machine Tool Co.

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Sundstrand Mach. Tool Co.

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Sundstrand Mach. Tool Co.

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Sundstrand Mach. Tool Co.

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Sundstrand Mach. Tool Co.

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Young Bros. Co.

OVENS, Industrial
Young Bros. Co.

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Merrell Mfg. Co.
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Ryerson & Co., Jos. T.
Sellers & Co., Wm.

PLATES, Steel
Jones & Laughlin Steel Corp.

POLISHING and Buffing Machines
Bryant Chucking Grinder Co.
Heald Mach. Co.
Rowbottom Machine Co.

PRESS Feeds
Littall Mach. Co., F. J.
V. & O. Press Co.

PRESSES, Arbor
Barnes Co., W. F. & John

PRESSES, Drop & Forging
Bliss, E. W. Co.
Niagara Mach. & Tool Wks.
Toledo Mach. & Tool Co.

PRESSES, Foot and Hand
Adriance Mach. Wks.
Ferracute Machine Co.
Niagara Mach. & Tool Wks.
Taylor & Fenn Co.

PRESSES, Forcing
Barnes Co., W. F. & John
Elmes Eng. Works, Chas. F.
Watson-Stillman Co.

PRESSES, Hydraulic
Elmes Eng. Works, Chas. F.
Watson-Stillman Co.

PRESSES, Power
Adriance Mach. Works
Bliss, E. W. Co.
Cincinnati Shaper Co.
Ferracute Machine Co.
Henry & Wright Mfg. Co.
Niagara Mach. & Tool Wks.
Henry Pels & Co.
Rockford Iron Works
Rowbottom Machine Co.
Chicago Flexible Shaft Co.
Toledo Mach. & Tool Co.
V. & O. Press Co.

PRESSES, Screw
Barnes Co., W. F. & John
Bliss, E. W. Co.

PROFILING Machines
Fischer Machine Co.
Gorton Mach. Co., Geo.

PULLEYS, Metal
Johnson Mach. Co.

PUMPS, Hydraulic and Power
Buffalo Forge Co.
Elmes Eng. Works, Chas. F.
Watson-Stillman Co.

PUMPS, Portable
National Acme Co.

PUNCHES, Center & Hand
Armstrong-Blum Mfg. Co.
Starrett Co., L. S.

PUNCHES, Power
Buffalo Forge Co.
Ferracute Machine Co.
Mitts & Merrill
Niagara Mach. & Tool Wks.
Henry Pels & Co.
Zeh & Hahnemann Co.

PUNCHES & Punch Retainers
Whitman & Barnes, Inc.

PUNCHING and Shearing Machines
Buffalo Forge Co.
Henry Pels & Co.
Ryerson & Son, Jos. T.
Wickes Bros.

RACKS, Storage
(See Furniture Machine Shop)

REAMERS, Adjustable
Cleveland Twist Drill Co.
Gammons-Holman Co.
Morse Twist Drill & Mch. Co.
Whitman & Barnes, Inc.

REAMERS, Solid
Cleveland Twist Drill Co.
Gammons-Holman Co.
Morse Twist Drill & Mch. Co.
National Tool Co.
Whitman & Barnes, Inc.

RIVET Making Machinery
National Machinery Co.

RIVETING Machines
Grant Mfg. & Machine Co.
High Speed Hammer Co.
United Machine Tool Corp.

RULES, Steel and Wood
Starrett Co., L. S.

RUST Preventives
American Lanolin Corp.
Oakite Products, Inc.

SAWING Machines, Band
Armstrong-Blum Mfg. Co.

SAWING Machines, Power Hack
Armstrong-Blum Mfg. Co.
Earle Gear & Mach. Co.
Peerless Machine Co.
Racine Tool & Mach. Co.

SAWS, Band
Racine Tool & Mach. Co.

SAWS, Circular Metal Cutting
Whitman & Barnes, Inc.

SAWS, Hack, Frames and Blades
American Saw & Mfg. Co.
Armstrong-Blum Mfg. Co.
Racine Tool & Mach. Co.
Starrett Co., L. S.

SAWS, Milling
National Tool Co.

SAWS, Screw Slotting
Starrett Co., L. S.

SCALES
Perkins Mach. & Gear Co.
Starrett Co., L. S.

SCRAPING Machines, Attachments
Anderson Bros. Mfg. Co.

SCREW Drivers, Automatic
Errington Mech. Laboratory

SCREW Extractors
Cleveland Twist Drill Co.

SCREW-MACHINE Work
Eastern Mch. Screw Corp.
Morris Machine Tool Co.

SCREW Machines, Automatic
Cone Auto. Mch. Co.
National Acme Co.

SCREW Machines, Plain or Hand
Jones & Lamson Mch. Co.

SCREWS, Cap and Set
Allen Mfg. Co.
Danly Mach. Specialties, Inc.
Eastern Mch. Screw Corp.
National Acme Co.
Strong, Carlisle & Hammond Co.

SCREWS, Machine
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Eastern Mach. Screw Corp.

SCREWS, Safety
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Standard Pressed Steel Co.

SECOND-HAND Machinery
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Emerman & Co., L. E.
Essley Machy. Co., E. L.
Hyman & Sons, Jos.
Miles Machy. Co.
Morey & Co., Inc.
Osborne & Sexton Mchy. Co.
Sonnenberg, Heinrich

SEPARATORS, Centrifugal
National Acme Co.

SEPARATORS, Magnetic
Ohio Elec. Mfg. Co.

SEPARATORS, Oil and Waste
Barrett Co., Leon J.

SHAFTING
Ryerson & Son, Jos. T.
Strand & Co., N. A.

SHAFTS, Flexible
Haskins Co., N. A.
Strand & Co., N. A.

SHAPERS
American Tool Works Co.
Cincinnati Shaper Co.
Hanson-Whitney Mach. Co.
Potter & Johnston Mch. Co
Ryerson & Son, Jos. T.
Smith & Mills Co.
Springfield Mach. Tool Co.

SHEARS, Power
Adriance Mach. Works
Buffalo Forge Co.
Ferracute Machine Co.
Mitts & Merrill
Niagara Mch. & Tool Works
Henry Pels & Co.
Toledo Mach. & Tool Co.
United Machine Tool Corp.

SHEET Metal Working Machinery
Adriance Mach. Works
Bliss, E. W. Co.
Cincinnati Shaper Co.
Ferracute Machine Co.
National Machine Tool Co.
Niagara Mch. & Tool Works
Henry Pels & Co.
Toledo Mach. & Tool Co.
United Machine Tool Corp.

SLOTTING Machines
Sellers & Co., Wm.

SLUSHING, Compounds
American Lanolin Corp.

SPECIAL Machinery and Tools
(See Contract Work)

SPEED Box, Motor Drive
Rivett Lathe & Grinder Corp

SPEED Reducers
Adams Co.
Boston Gear Works Sales Co.
Brown Instrument Co.
Cullman Wheel Co.
Earle Gear & Machine Co.
Foote Bros. Gear & Machine Co.
Grant Gear Works
Hartford Special Machy. Co.
Ready Tool Co.

SPRINGS
Philadelphia Gear Works

SPRING Winders
Hjorth Lathe & Tool Co.

SPROCKETS
Boston Gear Works Sales Co.
Cullman Wheel Co.
Grant Gear Works
Philadelphia Gear Works

SQUARES
Starrett Co., L. S.

STAMPINGS, Metal
Detroit Stamping Co.

STAMPS, Steel
Noble & Westbrook Mfg. Co.

STANDS, Portable
(See Furniture, Machine Shop)

STARTERS— Automatic A.C. and D.C.
(See Controller & Starters, Electric)

STEELS, Alloy, Carbon and High Speed
Latrobe Electric Steel Co.
Micro Machine Co.
Ryerson & Son, Jos. T.
Timken Roller Bearing Co.
Vanadium-Alloys Steel Co.

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Springfield Mach. Tool Co.

STUD Setters
Errington Mech. Laboratory

SUB Presses and Dies
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U. S. Tool Co.
Waltham Mach. Works

SWAGING Machines
Torrington Co.

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Allen Mfg. Co.

TAP Extractors, Broken
Walton Co.

TAP Holders
Errington Mech. Laboratory

TAPER Pins
Morse Twist Drill & Mch. Co.

TAPES, Measuring
Starrett Co., L. S.

TAPPING Machines and Attachments
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American Tool Wks. Co.
Baker Bros.
Barnes Drill Co., Inc.
Cincinnati Bickford Tool Co.
Errington Mech. Laboratory
Geometric Tool Co.
Moline Tool Co.
Murchey Mach. & Tool Co.
National Mchy. Co.

TAPS and Dies
Hanson-Whitney Machine Co.
Landis Machine Co.
Morse Twist Drill & Mch. Co.
Murchey Mach. & Tool Co.
National Acme Co.
National Tool Co.

TAPS, Collapsing
Eastern Mch. Screw Corp.
Geometric Tool Co.
Landis Machine Co.
Murchey Mach. & Tool Co.
National Acme Co.

TAPS, Ground
Hanson-Whitney Mach. Co.
Jones & Lamson Mach. Co.
Morse Twist Drill & Mch. Co.

TEMPERING Compounds
(See Case Hardening, etc.)

TESTING Apparatus, Hardness
Shore Instrument & Mfg. Co.
Wilson-Maeulen Co.

THREAD-Cutting Machines
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Ferner Co., R. Y.
Geometric Tool Co.
Grant Mfg. & Mch. Co.
Landis Machine Co.
Murchey Mach. & Tool Co.
National Mchy. Co.

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Geometric Tool Co.
Hanson-Whitney Machine Co.
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National Acme Co.

THREAD Rolling Machines
National Machinery Co.

TOOL Bits
Vanadium-Alloys Steel Co.

TOOL Holders
Lovejoy Tool Co., Inc.
Williams & Co., J. H.

TOOL Work
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TOOLS, Diamond
Desmond-Stephan Mfg. Co.

TRANSMISSION Equipment
Foote Bros. Gear & Machine Co.

TUBES and Tubing, Copper, Brass, Bronze, Seamless, Alloy, Etc.
Timken Roller Bearing Co.

TURNTABLES, Industrial
Canton Fdry. & Machine Co.

TURRET Machines
(See Lathes, Horizontal Turret)

TURRETS, Tool Post
American Tool Works Co.

UNIONS, Pipe
Dart Mfg. Co., E. M.

VALVES, Hydraulic
Elmes Eng. Works, Chas. F.

VISES, Drilling Machine
Armstrong-Blum Mfg. Co.
Armstrong Bros. Tool Co.
Hartford Special Mchy. Co.

VISES, Milling Machine
Cincinnati Milling Mach. Co.
Hartford Special Mchy. Co.

WASHERS, Plain
Detroit Stamping Co.

WASHING and Drying Machines, Metal Parts
Barrett Co., Leon J.

WELDING Machines, Electric Arc
Federal Mch. & Weld. Co.

WELDING Mchs., Elec. Spot., butt, seam
Federal Mch. & Welder Co.

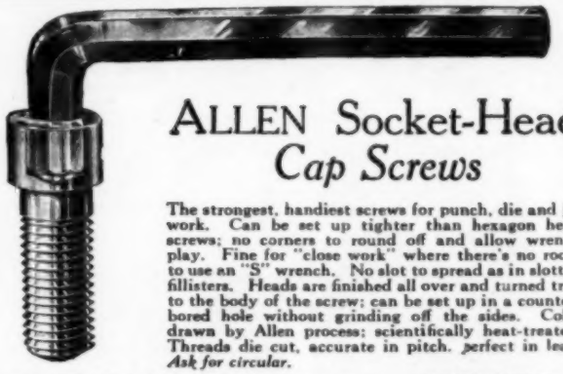
WOOD Working Machinery
Barnes Co., W. F. & John
Seneca Falls Machine Co.

WORM Drives
Hartford Special Machy. Co.

WRENCHES, Drop Forged
Armstrong Bros. Tool Co.

WRENCHES, Ratchet
Starrett Co., L. S.

WRENCHES, Tap
Starrett Co., L. S.



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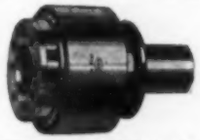

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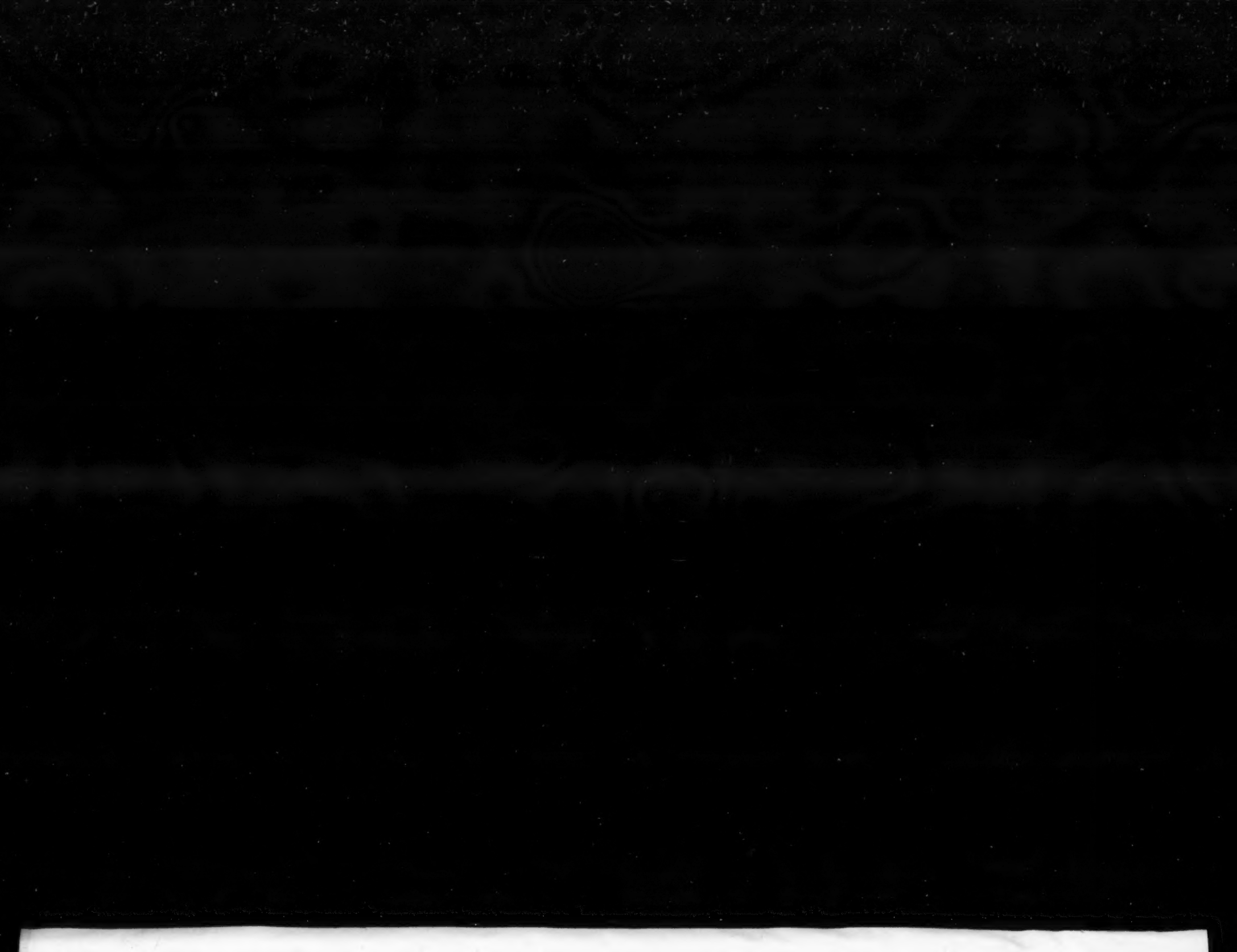
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